CCITT SG XV
Specialists Group on Coding for Visual Telephony

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Title: Consideration on forced updating

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1. Introduction

Forced update is an important function to obtain good service and picture quality, although this is not an item for standardization. The purposes of forced update are restoration of decoded pictures from damages due to transmission errors when the demand refreshing is not introduced, and improvement of picture quality, especially in the area of background. In this document, we study two parameters;
(1) quantizing step size,
(2) frequency of update.

2. Simulation

Signal to noise ratio and data generation rate are calculated based on RM4. Several step sizes are tested in the condition of open loop and intra mode.

Figure 1 shows the relationship between SNR and data generation rate for the first pictures of all test sequences. The figure shows that step size should be 8 to 12 to obtain reasonable quality (SNR is around 40 dB) for the 384 kbit/s rate.

Figure 2 shows the fluctuation of data generation along the time in GOB unit. For the moving picture, the maximum data generation in a GOB was 8 kbit for step size = 12. At the rate of 15 pictures/s which corresponds to 20 kbits/picture, the increase of approximately 40 percent per picture may affect picture quality.

3. Discussions

For designing forced update parameters the following conditions are to be taken into account;

(1) As a countermeasure for transmission errors, update time should be as short as possible, preferably less than 5 seconds or so.

(2) For improvement of decoded picture, update time should be determined so as not to affect the coding of moving picture. Optimum quantizer step size should be designed considering desired picture quality.

Therefore, the following set of parameters is an example to fulfill above conditions.

- One GOB in a picture is updated for every N coded picture. N = 3.

- The step size is kept constant in a GOB. Recommended value is around 10.

- The update pattern is that 1 GOB in every N coded picture with downward scanning.

Further study will be needed for coding control method since the variation of data generation may affect picture quality. The pattern of update also needs study. Further optimizations should be sought through hardware experiments.

Reference (1) Doc #98 "Forced updating" (France and Sweden)

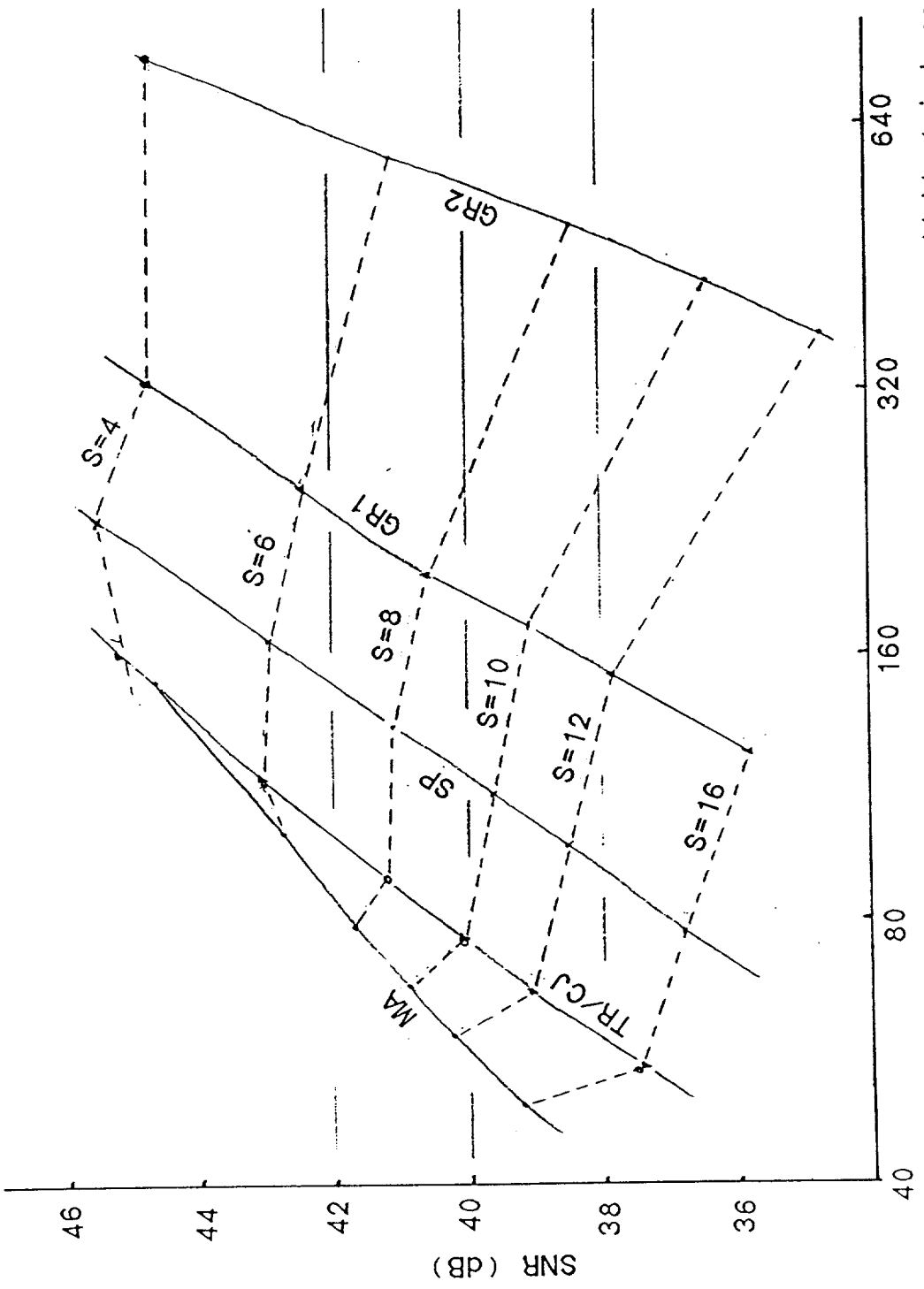

Figure 1 Relationship between SNR and data generation rate. First picture data. The data are obtained based on RM4 simulation. Signal in SNR = 255.

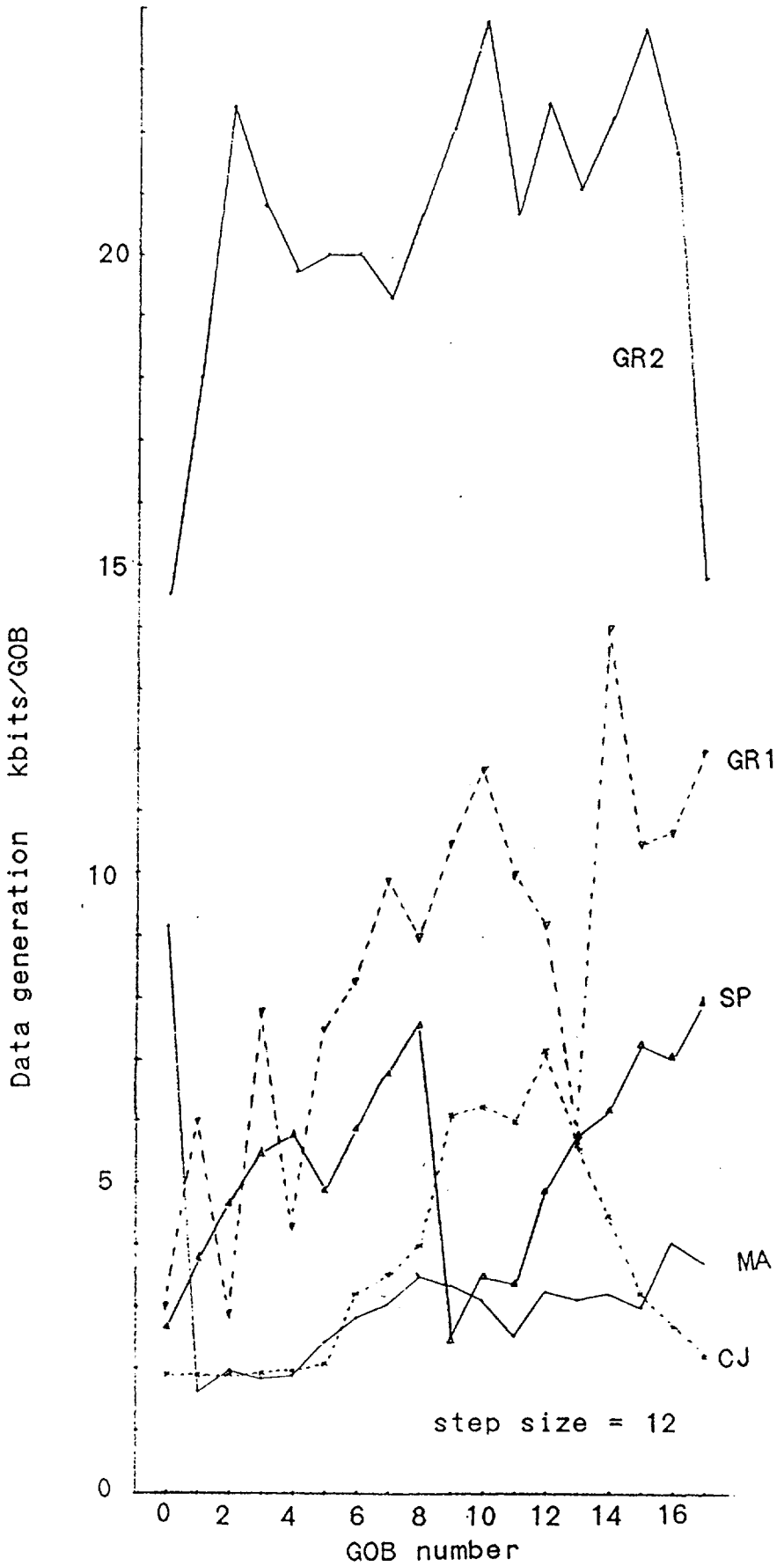

Figure 2 Fluctuation of data generation. First picture data. The data are obtained based on RM4 simulation.