CCITT
Question 4/XV
Specialist group on coding
for visual telephony
S/21/HP/26

Document n° 95

March 1986

TITLE : Examples of simulation with variable blocksize hybrid coding scheme (DCT) at 300 kbit/s.

SOURCE : France

The french simulation results, presented during the meeting in TOKYO, have been achieved according to a simplified version of the coding scheme depicted in document n° "Variable Blocksize hybrid coding scheme", and the following parameters have been used.

Picture format

COST sequence

Luminance : 360 X 288 Chrominance : 180 x 144
10 pictures/second (intermediate format subsampled 3 to 1).

Miss America

Luminance : 360 x 288 Chrominance : 180 x 144
15 pictures/second (intermediate format subsampled 2 to 1).

Checked Jacket

Luminance : 360 x 288 Chrominance : 180 x 144
10 pictures/second (intermediate format subsampled 3 to 1).

Bit-rate

304 kbit/s = 256 kbit/s (Y) + 24 kbit/s (U) + 24 kbit/s (V).

Transform

COST sequence)
(D C T
) 16 x 16, 16 x 8, 8 x 16 and 8 x 8 for luminance
Miss America (
) 16 x 16 for chrominance.
Checked Jacket (

Motion estimation

Motion estimation is done by full search block matching on luminance. The block size is 16 x 16. The maximum displacement is limited to - 7 and + 8. The displacement resolution is 1 pel.

Predictor

Intra frame, inter frame with no motion compensation or inter frame with motion compensation. Inter and intra frame modes can be used at used at the same time (fig. 1).

Quantisation strategy

$$Q^n = T + (n-1)G + \sum_{m=3}^{n-1} (m-2)D \quad n \geqslant 0 \text{ and symetrically for } n < 0.$$

16 possible combinations for T, G and D.

T and G are related to the buffer state (line of blocks)
D is related to the power of the prediction error (low coefficients, every block)
One quantizer per block
One bit allocation table.

Classification

There is a set of 16 predefinded scannings. The selected one minimizes the address of the last non zero-coefficient.

Variable length coding

4 variable length codes according to the bit allocation table.

Transmission buffer

Buffer size : 25 kbits. (see enclosed papers).

Regulation

8 modes (T, G and motion detection).

Standard conversion

* Simple filter $\frac{1}{4}$ (1 2 1) and subsampling to convert 720 pel/l into 360 pel/l.

* Linear interpolation from 50 Hz to 30 Hz according to BT-NTT document SIM/85/71.

* Frame repeat from to 10 Hz to 30 Hz for the COST sequence and the Checked Jacket sequence.

* Frame repeat from 15 Hz to 30 Hz for Miss America sequence.

* Linear interpolation from 30 Hz to 50 Hz according to BT-NTT document SIM/85/71.

* Simple filter $\frac{1}{2}$ (1 1) to interpolate pel to come back to 720 pel/l.

Preprocessing

Temporal noise reduction.

Postprocessing

Spatial noice reduction, edge enhancement.

Side information

No variable length code to reduce the bitrate devoted to the motion vector and the overhead.

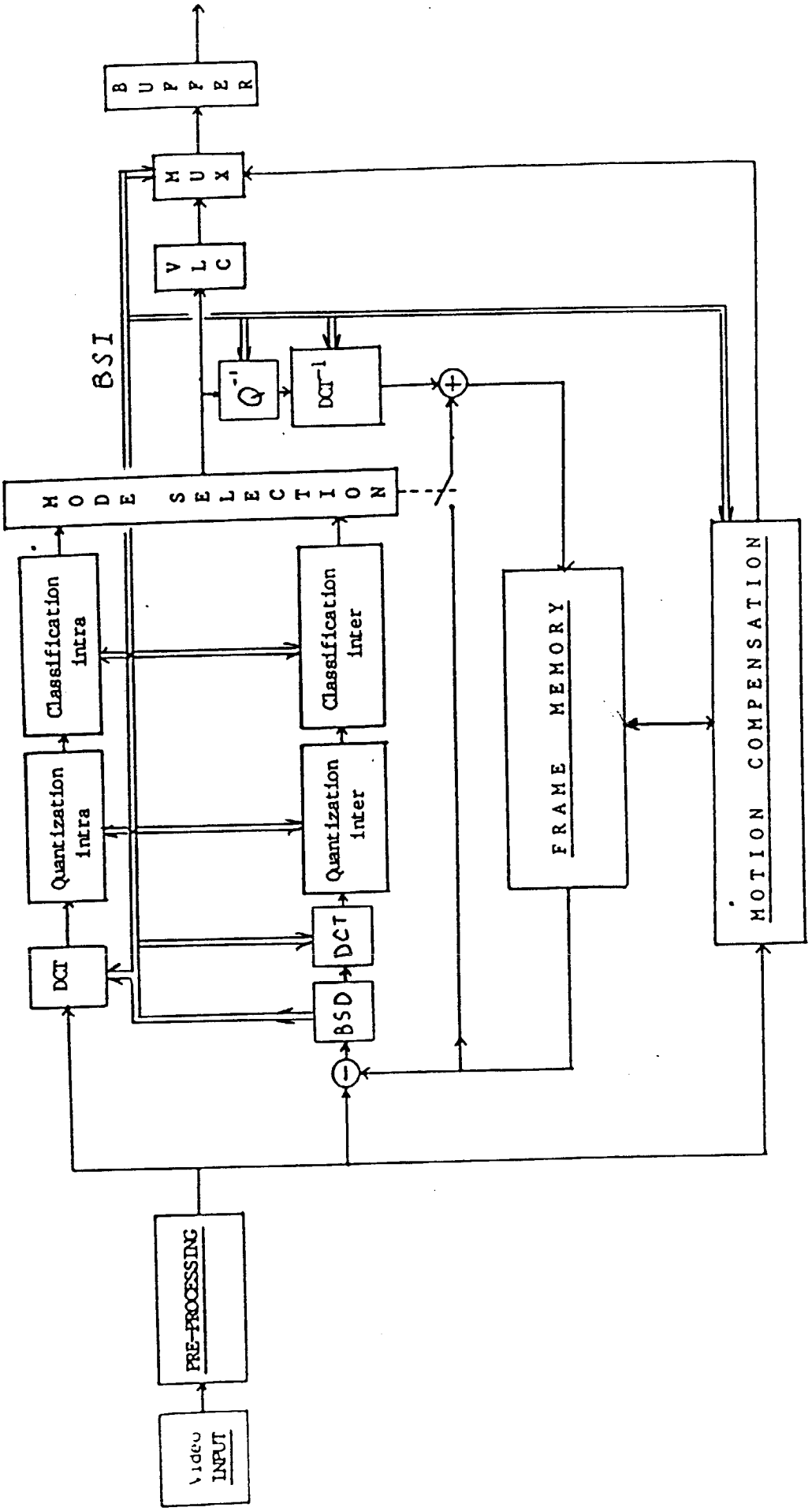
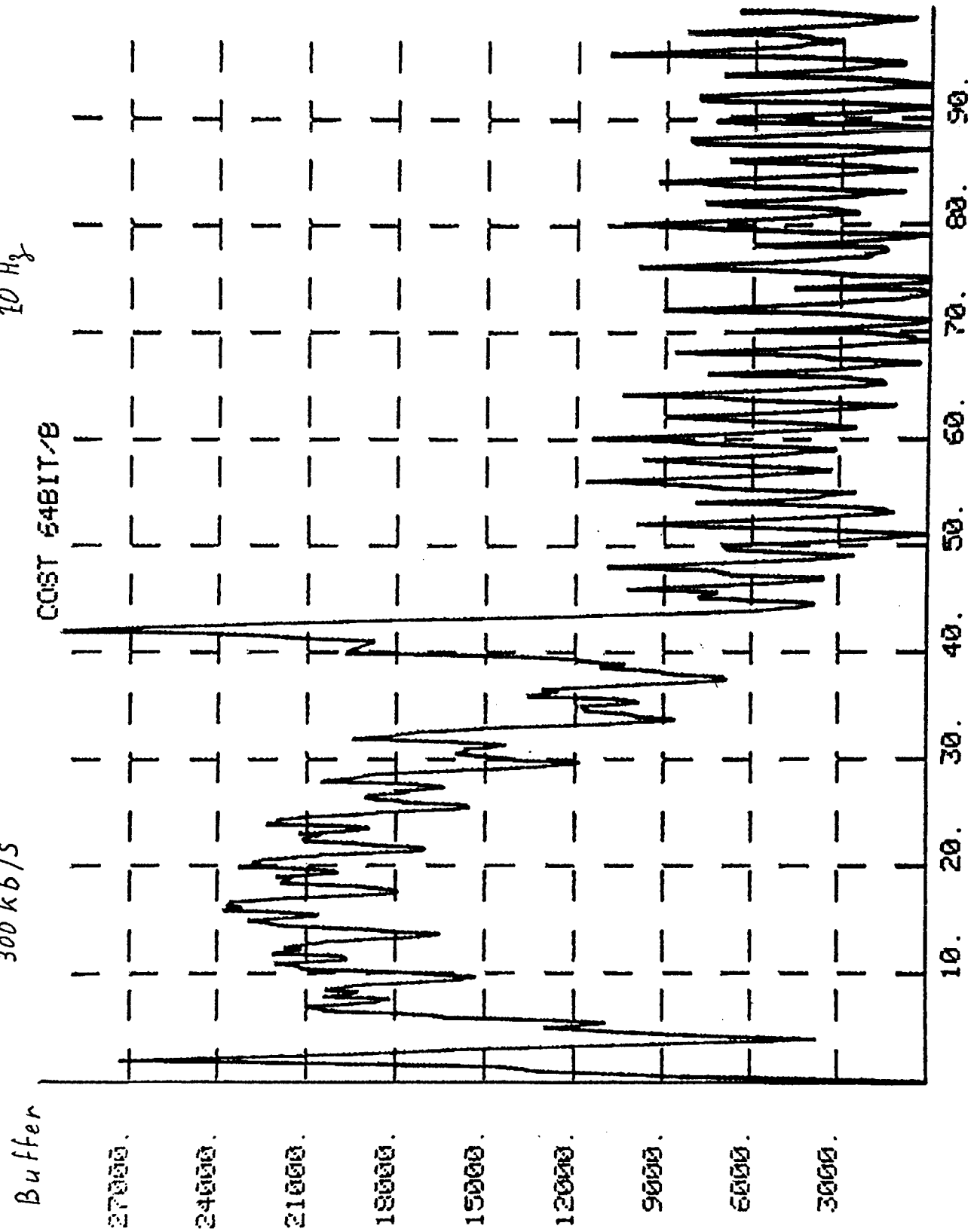
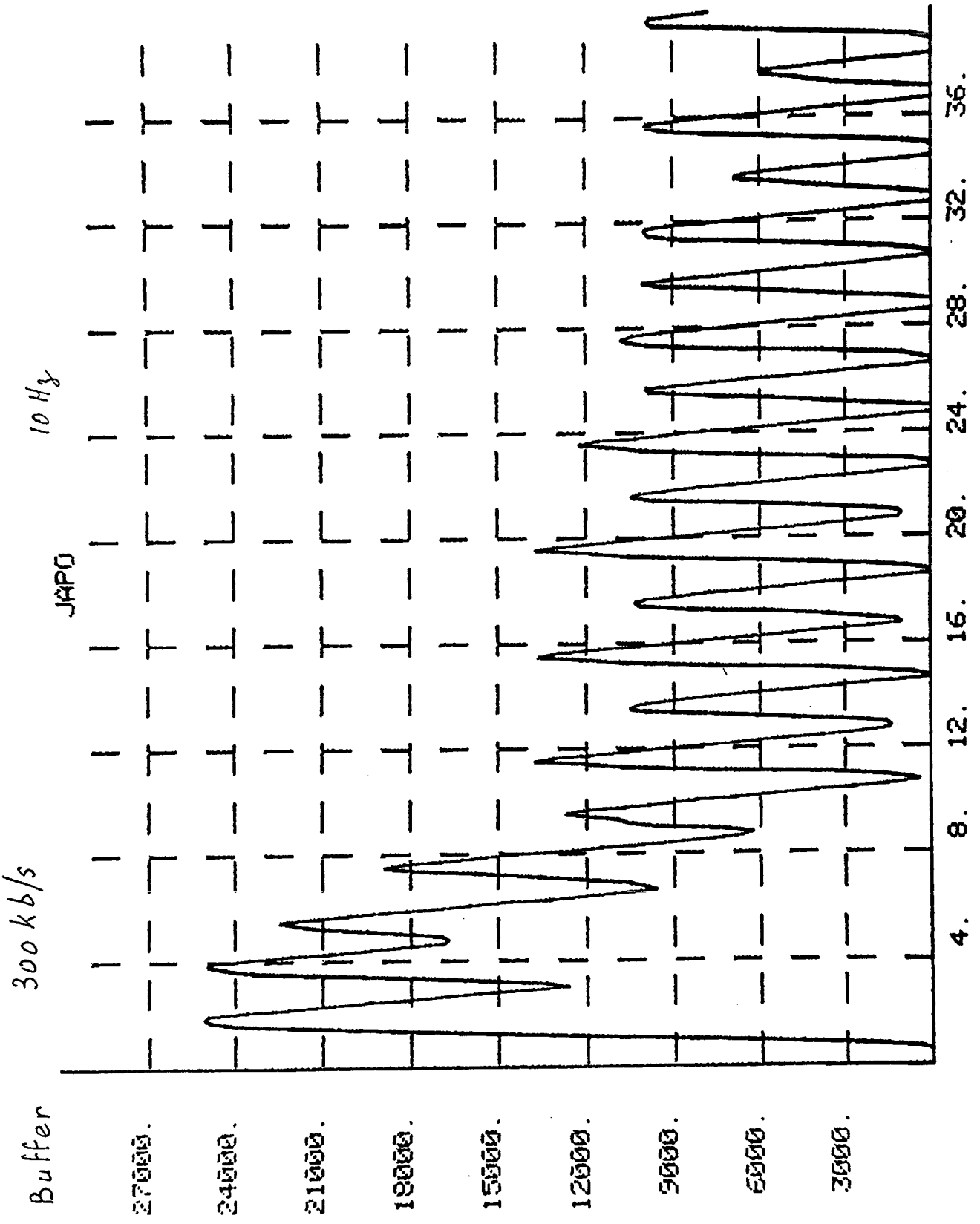
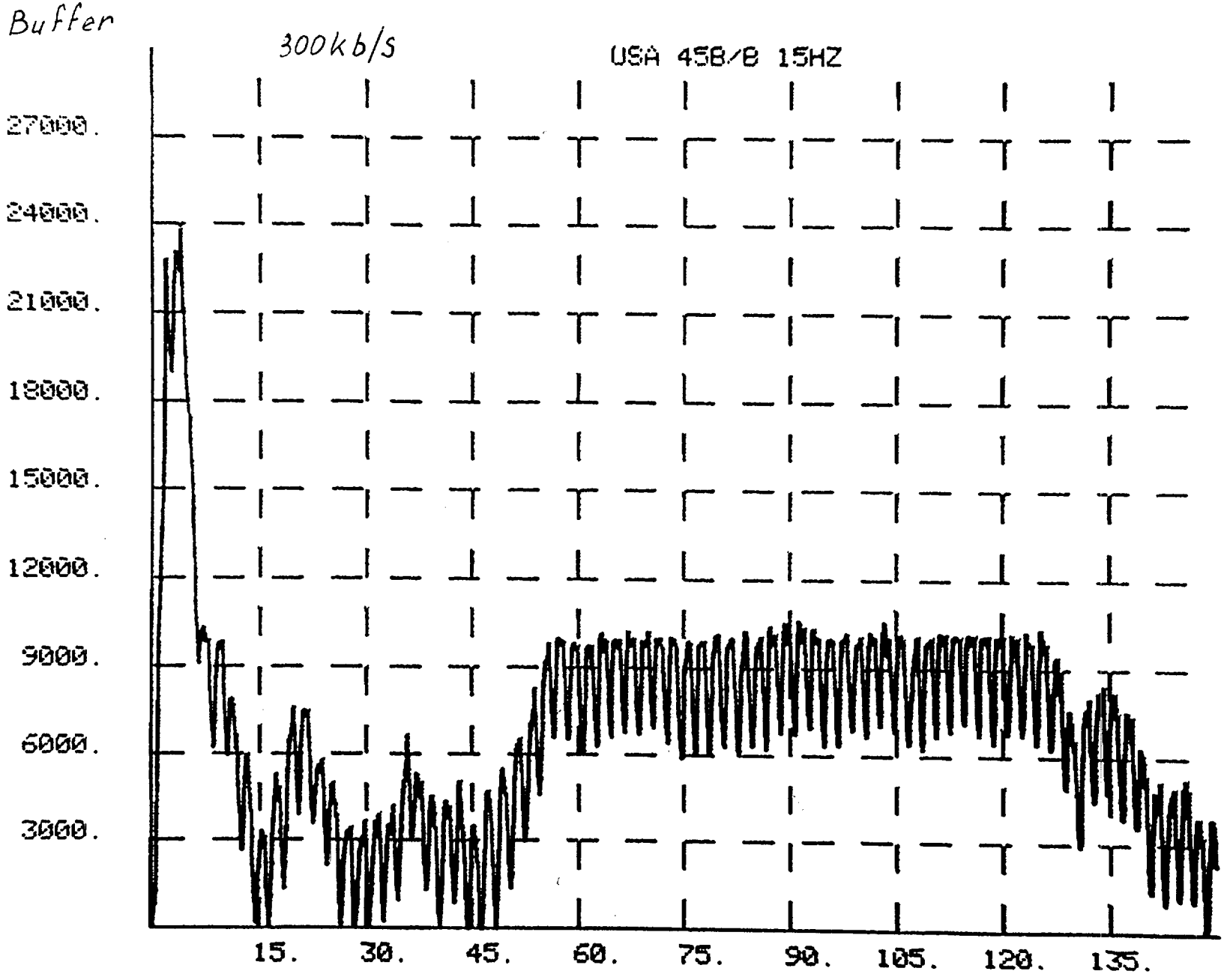


Fig. 1 : Hybrid codec structure with variable blocksize

BSD : Block size decision
BSI : Block size information


Buffer
300 kb/s
10 Hz
COST 54BIT/B
27000.
24000.
21000.
18000.
15000.
12000.
9000.
6000.
3000.
10.
20.
30.
40.
50.
60.
70.
80.
90.


Buffer
300 kb/s
10 Hz
JAPO
27000.
24000.
21000.
18000.
15000.
12000.
9000.
6000.
3000.
4.
8.
12.
16.
20.
24.
28.
32.
36.


Buffer
300kb/s
USA 458/8 15HZ
27000.
24000.
21000.
18000.
15000.
12000.
9000.
6000.
3000.
15.
30.
45.
60.
75.
90.
105.
120.
135.