AVC-164

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANIZATION INTERNATIONALE DE NORMALISATION

ISO-IEC/JTC1/SC29/WG11

CODED REPRESENTATION OF PICTURE
AND AUDIO INFORMATION

ISO-IEC/JTC1/SC29/WG11
MPEG 91/ 228
1991, November

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Title : Proposal Package

This document includes a full proposal description for the second phase of MPEG.

CONTENTS

1. Introduction

The generic coding method at a bit rate of up to about 10 Mbps proposed in this document is

- a coding method aiming to improve picture quality by an MC + DCT based coding algorithm considering forward compatibility to MPEG1 and H.261 (backward compatibility is not considered) and

- a coding method which deals with the input CCIR Rec. 601/525 format as an interlaced picture format without any preprocessing and

- a coding method which uses bi-directional prediction and interpolative prediction like MPEG1.

The features of the proposed method are the following four points.

1) This method contains adaptive inter field / inter frame prediction for motion compensation, which consists of a field interpolation mode and a frame interpolation mode considering an interlaced structure.

In this method, the motion vector estimation process consists of two stages. In the second stage, some candidates for the prediction signal are calculated through a spatio-temporal filter corresponding to an adaptive prediction, compared with each other and evaluated.

2) This method adopts a special rate control method. Rate control is realized hierarchically in this method at GOP, Picture and Slice layers combining feedforward control and feedback control to cope with changes in the coded signal characteristics owing to three picture types (I-picture, P-picture and B-picture).

3) This method uses quantization characteristics in which the weight changes according to a quantizer scale.

4) This method switches the scanning order of the DCT coefficients adaptively and uses an optimized VLC for the scanning order corresponding to the interlaced format.

2. Coding algorithm

2.1 Picture format

This coding method processes a moving picture defined in CCIR Rec. 601/525 without any preprocessing as an input picture. The size of each field is shown in Fig. 2-1 and it is an interlaced format (60 fields/sec).

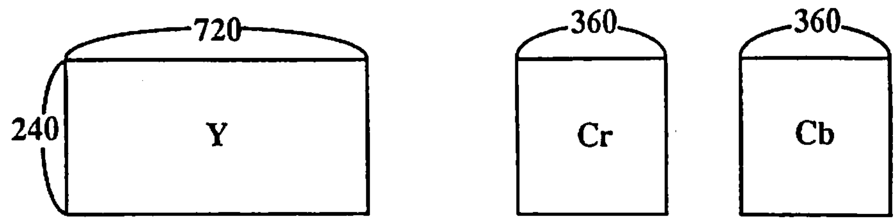


Fig. 2-1 Picture format

2.2 Structure of coded object

2.2.1 Layers

The unit of the coding operation is defined as a hierarchical structure as in MPEG1. The hierarchy is constructed from Blocks, Macroblocks, Slices, Pictures, Group of pictures (GOP), and Sequence from the bottom layer. A block contains 8 × 8 pixels and DCT is processed to this unit. A Macroblock consists of four blocks, i.e. two Y blocks together with corresponding Cr block and Cb block, and motion compensation and coding mode selection is executed to this unit. The relationship between each layer from Block to Picture is shown in Fig. 2-2.

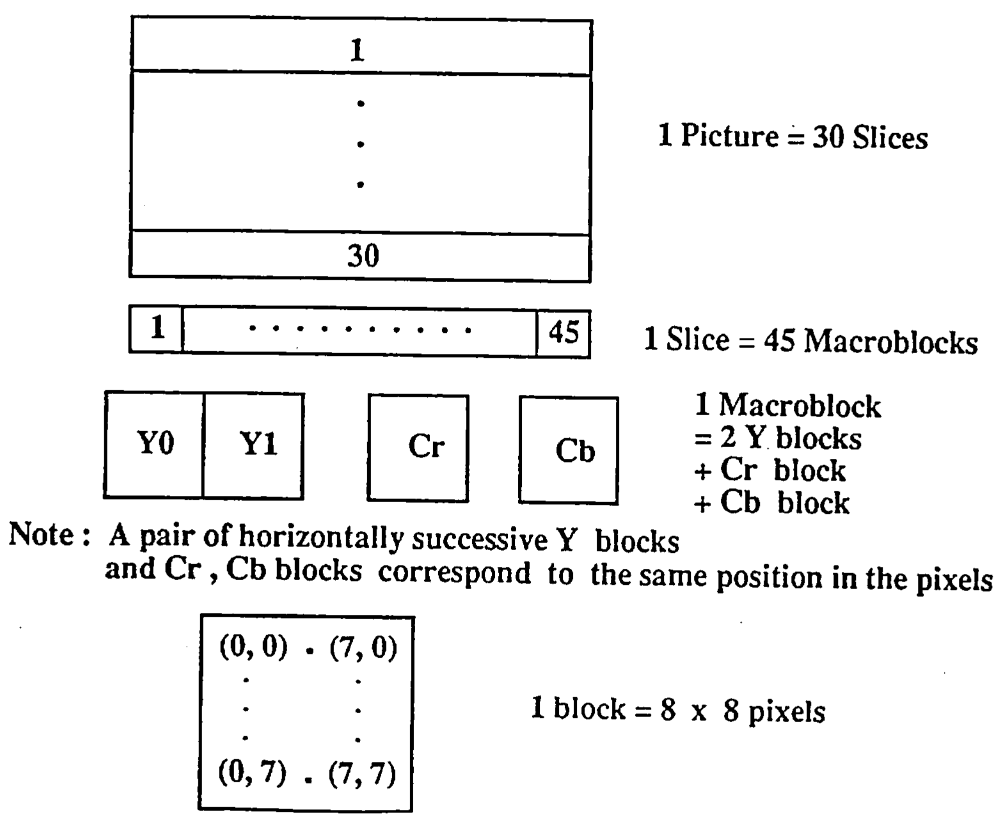


Fig. 2-2 Relationship between each layer

2.2.2 Structure of GOP

Picture is roughly categorized into three types (I-picture, P-picture, and B-picture) as in MPEG1 according to the allowed prediction mode at the Macroblock. The following four types are prepared as a predictive coding mode.

1) Intra field coding
2) Forward predictive coding
3) Backward predictive coding
4) Bi-directional interpolative predictive coding

The correspondence between each picture type and the allowed prediction mode is shown in Table 2-1.

Picture type	Allowed predictive coding mode
I-picture	Intra field coding
P-picture	Intra field coding Forward predictive coding
B-picture	Intra field coding Forward predictive coding Backward predictive coding Bi-directional interpolative predictive coding

Table 2-1 Picture type and predictive coding mode

In this proposal, an interlaced format is adopted as the coding picture format, and a different prediction method is applied even to the same type of picture according to its position in GOB. So, P-picture and B-picture is categorized further in detail into P0, P1, P2 and B0, B1, B2, B3, respectively. An I-picture always exists in an even field. The structure of GOP is shown in Fig. 2-3. As shown in the figure, GOP is defined as a set of pictures from the B0-picture four pictures before an I-picture to the P2-picture five pictures before the next I-picture.

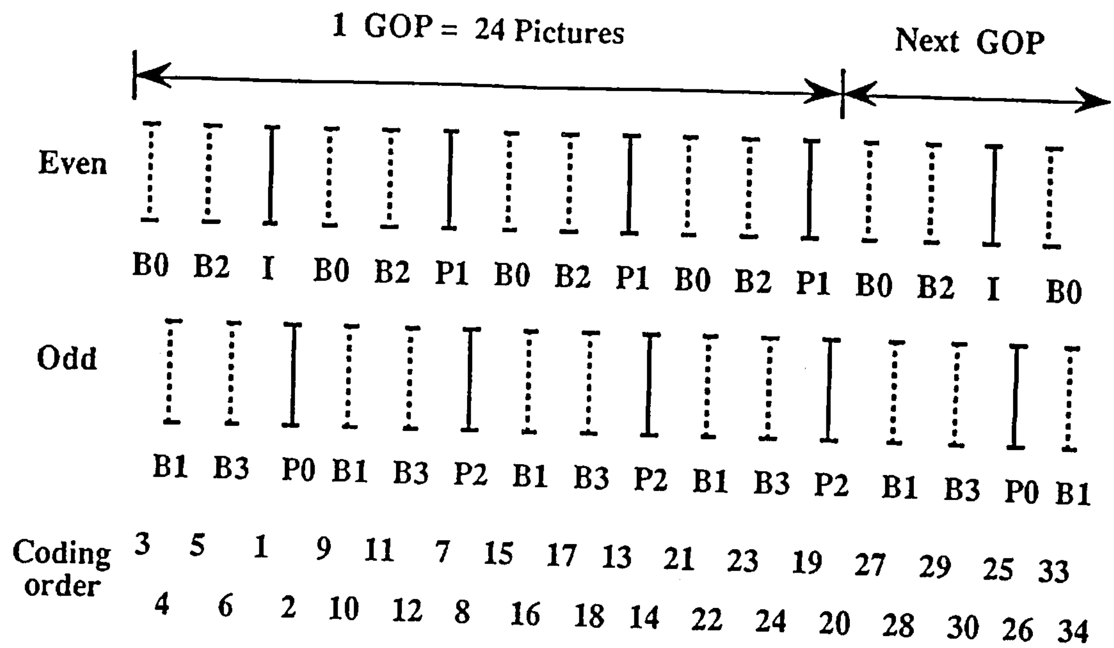


Fig. 2-3 Structure of GOP

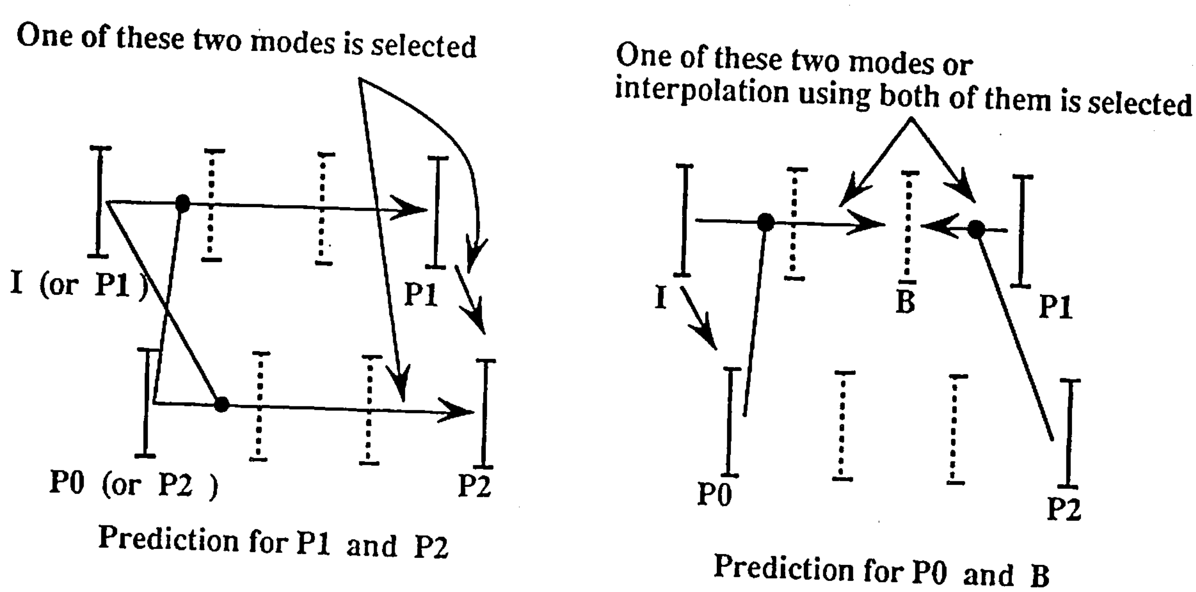


Fig. 2-4 Prediction for each picture

Table 2-2 and Fig. 2-4 show how and from which picture each picture is predicted. There are two types of prediction in forward prediction coding. One is inter field prediction from only an even field, and the other is adaptive inter field / inter frame prediction from a set of even and odd field. In Fig. 2-4, ⟶ denotes inter field prediction and ⇉ denotes adaptive inter field / inter frame prediction.

The coding order of each picture in GOP is also shown in Fig. 2-3.

Picture type	Prediction method and reference picture
I-picture	Without prediction
P0-picture	Inter field forward prediction from I
P1-picture	Adaptive inter field / inter frame prediction in forward direction from past P1 and P2 (or I and P0)
P2-picture	Selection from Adaptive inter field / inter frame prediction in forward direction from past P1 and P2 (or I and P0) and Inter field forward prediction from P1
B0-picture to B3-picture	Selection from Adaptive inter field / inter frame prediction in forward direction from past P1 and P2 (or I and P0) and Adaptive inter field / inter frame prediction in backward direction from P1 and P2 (or I and P0) in the future and Bi-directional interpolative prediction from past P1 and P2 (or I and P0) and P1 and P2 (or I and P0) in the future

Table 2-2 Prediction method and reference picture for each picture type

2.3 Block diagram and outline of coding process

The proposed algorithm is basically based on motion compensation and DCT coding. Figure 2-5 shows the encoder block diagram of the proposed method. Some input fields are stored in individual field memories. These fields are sent to a motion vector estimator 1, and here the motion vector at the first stage is estimated in one pixel precision using pictures before coding by telescopic search (cf. 2.4). Following this, the estimated vector is refined by fully searching the range of ±1 around the estimation in the first stage as preprocessing for the second stage, using locally decoded pictures in field memories in the local decoding loop. Next, the second stage is as follows. In this stage, the motion vector in half pixel precision is estimated at motion vector estimator 2, a filter for adaptive prediction, and field memories to determine the prediction signal. Prediction error is processed through the DCT, quantizer, adaptive scanner, and two-dimensional variable length coder, and sent to the multiplexer. On the other hand, the quantized data is used for local decoding through the dequantizer and inverse DCT. Only locally decoded signals for the I-picture and P-picture are stored in the field memory. The number of field memories necessary in the local decoding loop is four for preparing adaptive prediction signals. The coefficient data is multiplexed at the multiplexer to side informations such as the motion vector, Macroblock type, quantizer scale, etc. The multiplexed information is output through a buffer. The coding controller determines the quantizer scale value according to the amount of buffer contents and the activity of the input picture pre-examined before coding (for I-picture) or the activity of the adaptive prediction error signal obtained in the coding process (for P and B-pictures).

Fig. 2-6 shows a block diagram of the processing element of the adaptive inter field / inter frame predictor. Reference data for adaptive prediction are read out from the decoded field memory. The accessing position of the reference is pointed by the corresponding motion vector from the motion vector estimator 1. The forward (backward) prediction signal is generated by operating a spatial filter or spatio-temporal filter to one or two of these references or by selecting one of the references itself. An actually used prediction signal is that selected from the forward prediction signal, backward prediction signal, and their average.

Fig. 2-7 shows the decoder block diagram of the proposed method. The DCT coefficient signal is decoded by the variable length decoder. After this, the same decoding process as that of the local decoder in the encoder follows. The motion vector transmitted as a difference vector is reformed to a normal vector after being variable length decoded.

The output of the pictures for display is switched between the I and P-pictures from the field memory and the B-picture directly from the decoding process, because the decoding order and displaying order is different, and also because it is not necessary to store a B-picture which is not used as a reference for prediction.

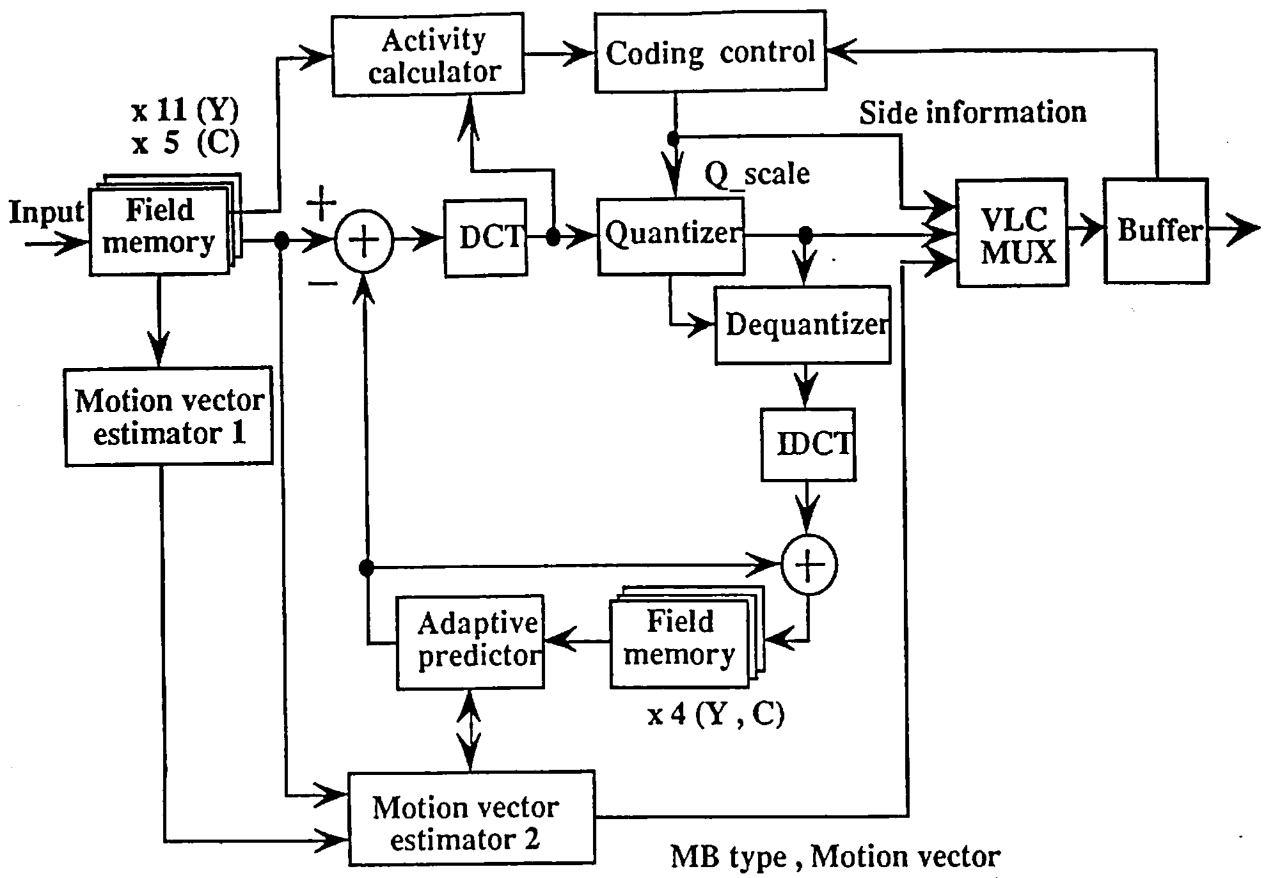


Fig. 2-5 Encoder block diagram

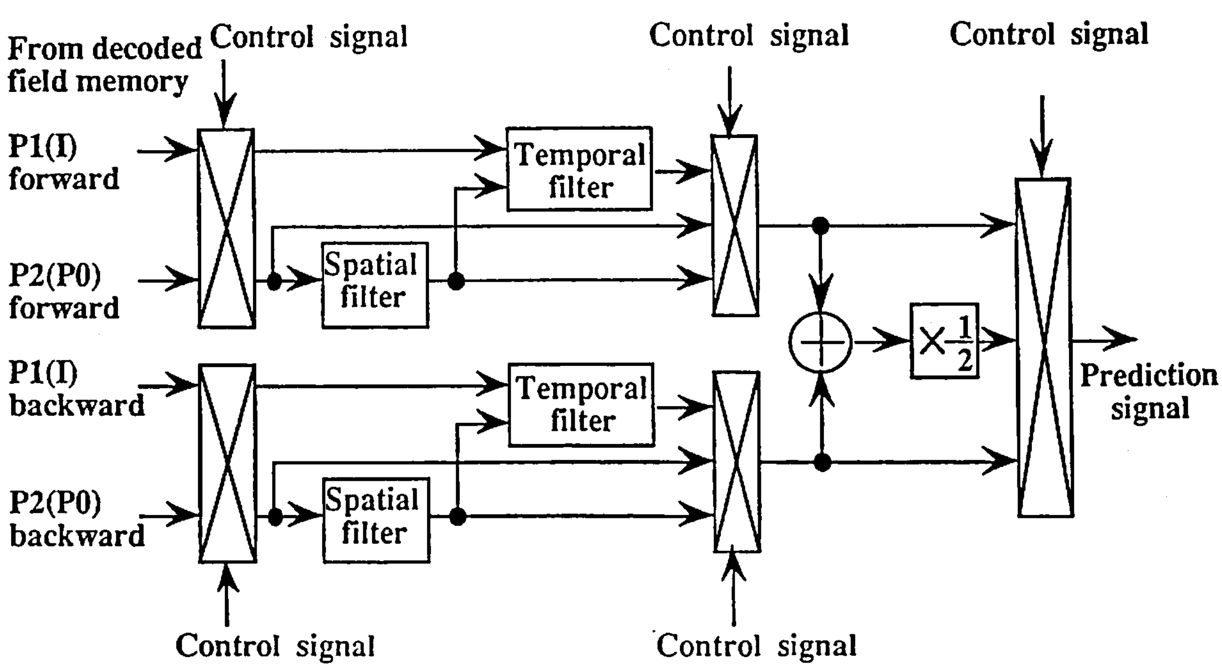


Fig. 2-6 Adaptive inter field / inter frame prediction processing element

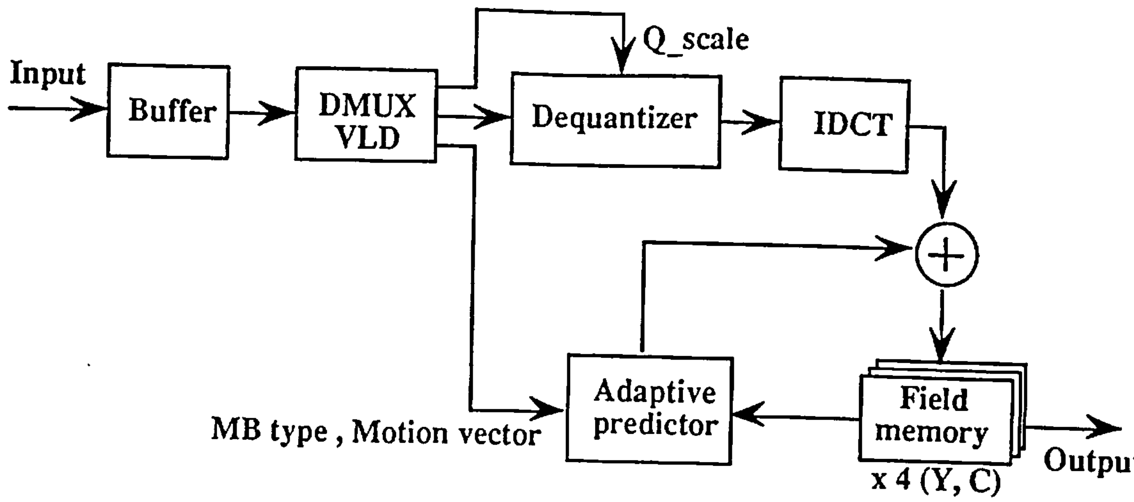


Fig. 2-7 Decoder block diagram

2.4 Motion compensation and search for motion vector

Motion compensation is applied to each Macroblock. The motion estimation process consists of two stages in this proposal i.e. the usual motion estimation in one pixel precision by block matching (1st stage) and motion estimation by searching all candidates for the prediction pixel adaptively interpolated in half-pixel precision around the first estimated motion vector (2nd stage). A more precise way for adaptive interpolation is explained in the next section.

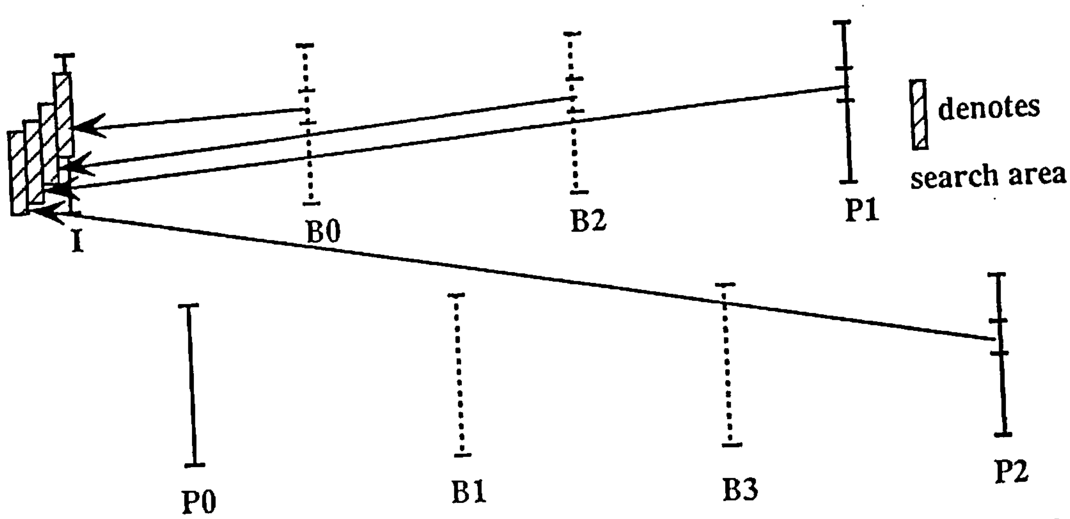
The first motion estimation stage is a process to search an optimal motion vector in one pixel precision for each field comparing the input pictures. Telescopic search (cf. MPEG1 SM3 specification) is applied to a set of fields whose distance is more than two fields. Note that there are plural search paths in case of interlaced pictures. In this proposal, the search path is determined according to the following rules.

1) Search between fields with the same interlacing phase, even or odd
   Use only fields with the same interlacing phase.
2) Search between fields with a different interlacing phase
   Use as little fields with a different interlacing phase as possible. It is necessary to contain in the whole search path the search to a field with a different interlacing phase at least once. In this proposal, the searching order is selected so as to search the fields with a different interlacing phase as the last search as shown in Fig. 2-8.

Telescopic search is applied to forward and backward directions independently. The size of the search area at each search step is ±15 for the horizontal direction and ±7 for the vertical direction.

The second stage motion estimation is executed using pictures in the field memories in the local decoding loop as reference. Before the main process, the motion vector estimated at the first stage is refined by fully searching the range of ±1 around the obtained motion vector as a preprocess. The main process of the second stage is executed by selecting an optimal prediction signal from the candidates of the prediction signal calculated around the refined vector in half-pixel precision by the method explained in the next section, evaluating and comparing each power of prediction error.

Motion estimation is not executed for the chrominance signal, but motion compensation is applied using the motion vector calculated from the motion vector used for the corresponding luminance signal.



ex. When motion vector from I to P is searched, the searching order is
I ⟶ B0 ⟶ B2 ⟶ P1 ⟶ P2

Fig. 2-8 Searching order in " telescopic search "

2.5 Adaptive inter field / inter frame prediction

The main process of the second stage motion estimation is a search in half pixel precision around the optimal vector obtained in the preprocess. Figure 2-9 shows how the process is carried out. This adaptive inter field / inter frame prediction is executed for P1, P2, and B-pictures, and uses a pair of even and odd fields as reference fields. In Fig. 2-9, suppose that the optimal vectors for the individual fields (field #1 and #2) are obtained as v1 and v2 in the first stage (denoted by ● in the figure). Search is executed around these two points in the second stage. There are two modes prepared for generating prediction signal candidates in the second stage. One is the field interpolation mode and the other is frame interpolation mode.

Candidates are generated only by a spatial filter in the field interpolation mode. For example in the figure, intra field interpolated pixel values p1 to p3 are calculated by the following formula.

$$P1 = \frac{1}{2} (P0 + P4)$$
$$P2 = \frac{1}{4} (P0 + P4 + P5 + P6)$$
$$P3 = \frac{1}{2} (P0 + P6)$$

9 candidates are generated in this mode for even and odd fields. So, a total of 18 candidates are available.

Candidates are generated in the frame interpolation mode by operating a spatio-temporal filter to the pixels motion compensated in 1 pixel precision at each field. For the example in the figure, inter frame interpolated pixel values p1' to p3' are calculated by the following formula.

$$P1' = \frac{1}{2} \times P7 + \frac{1}{4} (P1 + P4)$$
$$P2' = \frac{1}{2} \times P7 + \frac{1}{8} (P0 + P4 + P5 + P6)$$
$$P3' = \frac{1}{2} \times P7 + \frac{1}{4} (P0 + P6)$$

We call such a field a base field that provides the pixel value in half-pixel precision and corresponding vector a base vector. There are also 9 candidates in this mode generated for even and odd field, but the candidates for position 0 for each field give the same value. So, a total of 17 candidates are available in this mode.

All of these 35 candidates are evaluated in the second stage, compared, and a candidate which gives the least prediction error is selected as the prediction signal. However, candidates from the frame interpolation mode is not selected when the direction of the motion vector for both fields are very different (more precisely explained later). A one bit flag is transmitted to show which mode is selected. Another one bit flag is transmitted to show which field is selected in the field interpolation mode or which field is selected as a base field in the frame interpolation mode. Inter field prediction in P0 and P2-pictures is carried out by applying the field interpolation mode to a single field. No flag is transmitted in this case. In the B-picture case, only a field with a different interlacing phase from a field to be coded can be selected as the base field in the frame interpolation mode. No flag is transmitted to show which field is selected as the base field.

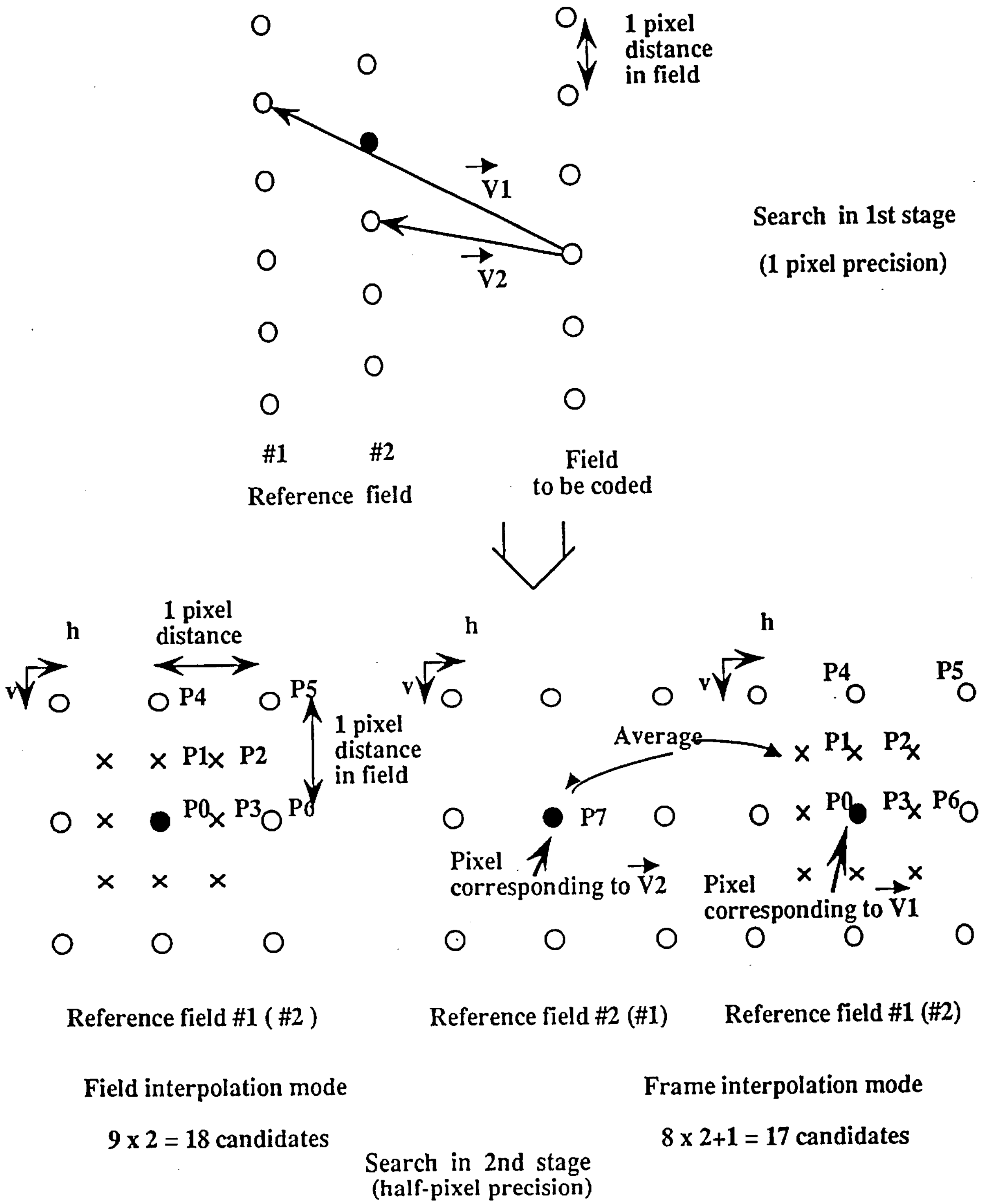
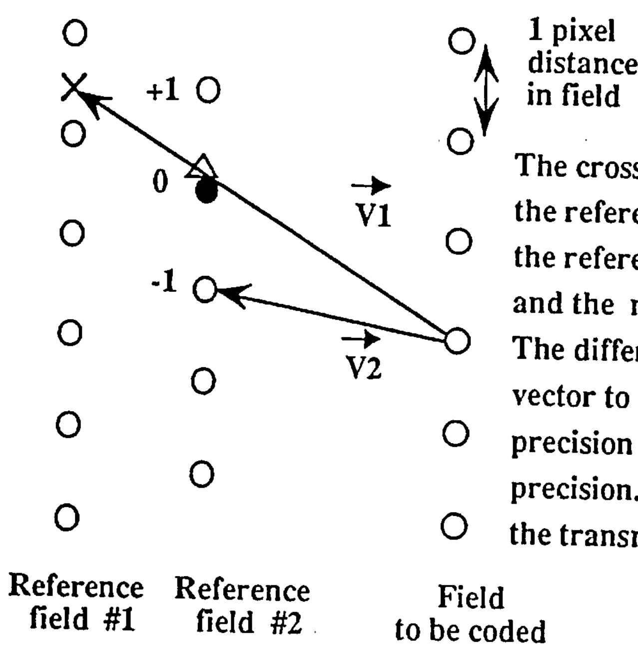


Fig. 2-9 Adaptive inter field / inter frame prediction

Motion vectors are transmitted in the following forms. First, the motion vector in the field interpolation mode or the base motion vector in the frame interpolation mode is transmitted in half-pixel precision. When the frame interpolation mode is selected, the motion vector other than a base vector follows as a difference vector to the base vector. The motion vectors to both fields likely to give a similar direction in this case. So, the rule to transmit the difference vector is determined as follows. First, the cross point of the expanded base motion vector and fields other than the base field is calculated. Next, the motion vector in one pixel precision corresponding to the nearest point to the cross point is calculated. Then, the difference between the vector other than the base vector and the calculated vector is transmitted in one pixel precision. The frame interpolation mode is inhibited when the difference vector exceeds the range of ±1 (see Fig. 2-10). By applying this rule, the amount of motion vector information can be saved without degrading the performance of prediction, because the frame interpolation mode is useful only when the direction of the two vectors is nearly the same.



The cross point of the motion vector to the reference field #1 ($\vec{V1}$) and the reference field #2 is calculated (△) and the nearest pixel is determined (●). The difference between ● and the motion vector to the reference field #2 in one pixel precision ($\vec{V2}$) is transmitted in one pixel precision. (In the Fig. 2-10 case, the transmitted value is -1.)

Fig. 2-10 Transmission of motion vector

Motion compensation for the chrominance signal is executed based on the motion vector obtained for its corresponding luminance signal. The luminance signal and the chrominance signal have the same number of pixels in the vertical direction but the chrominance signal has half the pixels of the luminance signal in the horizontal direction in the same Macroblock. So, when the motion vector is applied to the chrominance signal, the horizontal component of the vector is divided by 2. The division is executed so that any fractional part is rounded to the direction toward zero. This situation is the same for both the field interpolation mode and the frame interpolation mode. An example of the process is shown in Fig. 2-11. In this figure, circles drawn by a dotted line show the pixel position at which no chrominance signal exists. Suppose that the center position of nine circles corresponds to the motion vector obtained in the first stage and x is that obtained in the second stage. Suppose also that the horizontal component of the center circle is smaller than that of the origin in this example. In the field interpolation mode, when the motion vector is obtained by dividing the motion vector for the luminance signal by 2 at the x position, the quarter pixel precision component is rounded to the direction toward zero, and the interpolated value is calculated for the position shown by Δ. This means that the prediction signal is calculated by the following formula.

$$\triangle = \frac{1}{4}(q1 + q2 + q3 + q4)$$

The same calculation rule for the prediction signal is applied to the reference field #1 in the frame interpolation mode. This means that the interpolated pixel value is calculated for the Δ position by the following formula.

$$\triangle = \frac{1}{4}(q5 + q6 + q7 + q8)$$

On the other hand, the interpolation pixel value in the reference field #2 becomes the pixel value of the pixel at position 9, because the half-pixel precision component of the motion vector for chrominance signal is rounded to the direction toward zero.

It is concluded in this example that the prediction signal for the chrominance signal in the frame interpolation mode is calculated by the following formula.

$$\frac{1}{2} \times q9 + \frac{1}{8}(q5 + q6 + q7 + q8)$$

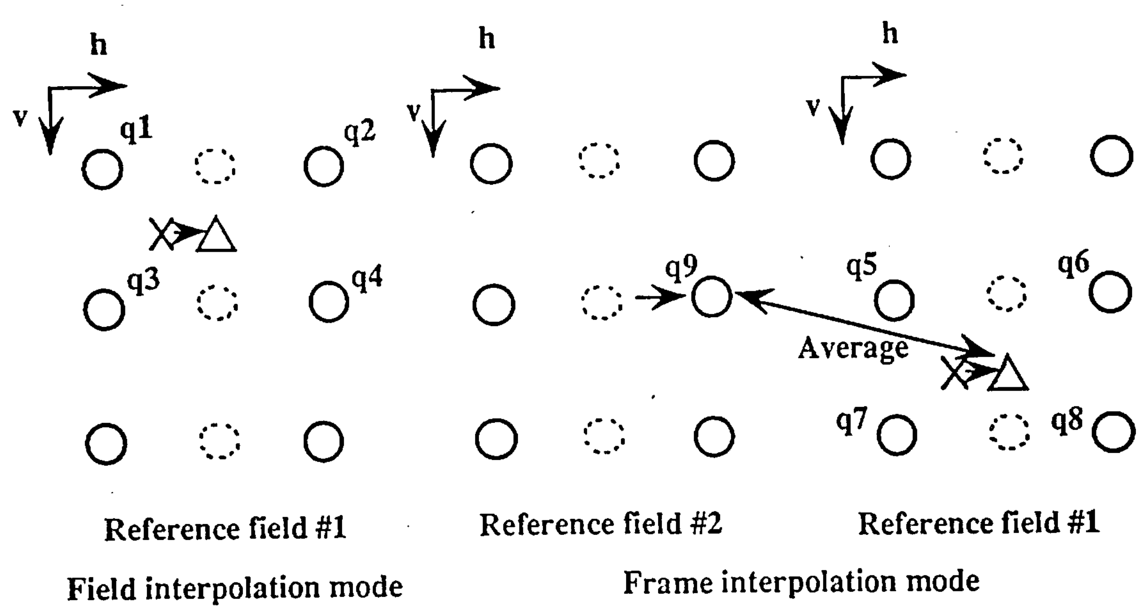


Fig. 2-11 Motion vector for chrominance signal

2.6 Macroblock type and type selection

2.6.1 I-picture

The variation in the Macroblock type in the I-picture is the same as that of the intra frame in MPEG1. In this simulation, Intra with modified Q is not used.

2.6.2 P-picture

The variation in the Macroblock type and rules for type selection in P0 and P1-pictures are the same as those in the predicted frame in MPEG1 SM3.
The variation of the Macroblock type in the P2-picture is the following.

- Near-field predicted, not coded
- Near-field predicted, coded (with modified Q)
- Far-frame predicted, not coded
- Far-frame predicted, coded (with modified Q)
- Intra (with modified Q)

'Near-field predicted' denotes inter field prediction using only the immediately prior P1. 'Far-frame predicted' denotes inter field / inter frame adaptive prediction using I (P1), 7 fields before and P0 (P2), 6 fields before. Selection from these is executed based on the decision tree shown in Fig. 2-12. Note that this figure is generated by replacing 'Forward' and 'Backward' to 'Near field' and 'Far frame' and removing the branch corresponding to the interpolation mode in the decision tree for the interpolated frame in MPEG1 SM3. In this simulation, modes with modified Q are not used.

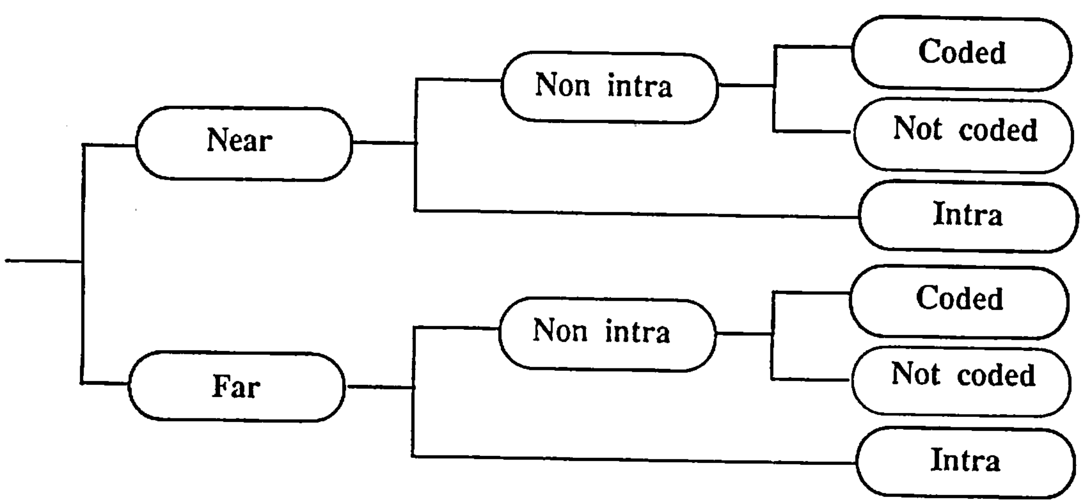


Fig. 2-12 Decision tree for P2-picture

2.6.3 B-picture

The variation in the Macroblock type and rules for type selection in the B-picture are the same as those in the interpolated frame in MPEG1 SM3.

2.7 Quantization

This proposal utilizes the quantization property with which the ratios between any two of the weighting coefficients for each sequency of DCT coefficients change according to the quantizer scale value. The quantizer for each sequency is a linear quantizer without a dead zone in Intra case and with a dead zone in a Non-intra case (same as those of MPEG1 SM3).

Figure 2-13 shows the relationship between the step size and the sequency number at each quantizer scale. These properties are obtained by (number read from a fixed matrix) / 8 × (quantizer scale) + (offset). The fixed matrices are shown in Fig. 2-14.

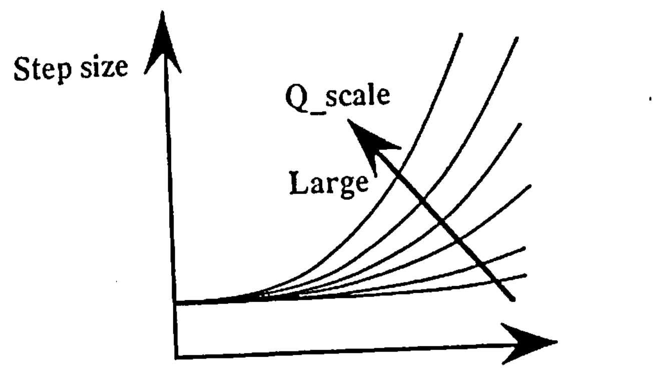


Fig. 2-13 Quantization property

By using this quantization property, the less the usable bit rate becomes and coarser the selected quantizer becomes, the lower the priority of the higher sequency compared to the lower sequency becomes. The feature of this quantization property is that the relationship between the quantizer scale and the step size at each sequency is represented by a non-linear function, and the ratio of the step size for low sequency and that for high sequency changes according to the quantization scale. The offset values are 8 for Intra and 2 for Non-intra.

0	8	11	14	18	19	21	26
8	8	14	16	19	21	26	29
11	14	18	19	21	26	26	30
14	14	18	19	21	26	29	32
14	18	19	21	24	27	32	40
18	19	21	24	27	32	40	50
18	19	21	26	30	38	48	61
19	21	27	30	38	48	61	75

Intra

8	10	12	14	16	18	20	22
9	11	13	15	17	19	21	23
10	12	14	16	18	20	22	24
11	13	15	17	19	21	23	25
12	14	16	18	20	22	24	26
13	15	17	19	21	23	25	27
14	16	18	20	22	24	26	28
15	17	19	21	23	25	27	29

Non-intra

Fig. 2-14 Weighting matrices to generate quantization properties

2.8 Adaptive scanning

This proposal utilizes adaptive switching of the scanning order of the DCT coefficients, because the distribution of the power of the DCT coefficients show different properties from that of CIF in H.261 and SIF in MPEG1 owing to the interlaced structure of the input signal. Switching is executed automatically by the condition combining Intra / Non-intra and luminance / chrominance, so no extra side information is necessary to show the scanning order. The scanning orders for the individual conditions are shown in Fig. 2-15.

0	2	6	12	20	28	34	50
1	4	11	19	27	33	35	51
3	8	17	25	31	36	49	52
5	10	18	26	32	37	48	53
7	15	23	30	39	38	47	54
9	16	24	40	45	46	55	60
13	21	29	41	44	56	59	61
14	22	42	43	57	58	62	63

Intra Y

0	1	5	6	14	15	27	28
2	4	7	13	16	26	29	42
3	8	12	17	25	30	41	43
9	11	18	24	31	40	44	53
10	19	23	32	39	45	52	54
20	22	33	38	46	51	55	60
21	34	37	47	50	56	59	61
35	36	48	49	57	58	62	63

Intra C

0	8	16	24	32	40	48	56
1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63

Non-intra Y

0	1	2	3	4	7	15	34
5	6	8	10	14	26	35	56
9	11	13	16	25	36	43	58
12	18	17	24	30	42	50	59
19	23	27	29	41	48	52	60
20	28	31	37	44	49	54	61
21	32	38	40	46	51	55	62
22	33	39	45	47	53	57	63

Non-intra C

Fig. 2-15 Scanning order table

2.9 Variable length coding

1) Macroblock address

The same VLC table as that of MPEG1 is used.

2) Macroblock type

For I, P0, P1, and B-pictures, the same VLC table as that for the I, P and B-pictures, respectively, in MPEG1 is used. As for P2-pictures, the same VLC table as that for the B-picture in MPEG1 SM3 interpreting 'Forward' and 'Backward' as 'Near-field' and 'Far-frame' is used.

3) Motion vector

- The motion vector in the field interpolation mode or the motion vector for the base field in the frame interpolation mode (half-pixel precision in both cases) is transmitted as the difference vector to that of the motion compensated Macroblock placed left to the attended Macroblock selected according to the priority shown in Table 2-3. The same VLC table as that of MPEG1 is used to transmit the difference vector.
- In case of the frame interpolation mode, the motion vector for fields other than the base field as the difference vector to the motion vector for the base field is transmitted in a limited range of ±1 in one pixel precision by the VLC table shown in Table 7-4g.

Priority 1 When the previous Macroblock is a motion compensated Macroblock and the interlacing phase of the attended field and the selected field in the field interpolation mode or the base field in the frame interpolation mode is the same, take the difference with the vector to that field.

Priority 2 When the previous Macroblock is a motion compensated Macroblock and the attended Macroblock is predicted by the frame interpolation mode and the interlacing phase of the attended field and the base field is different, reconstruct the motion vector to the field with the same interlacing phase from the difference vector and make a difference with that vector.

Priority 3 When the previous Macroblock is a motion compensated Macroblock and the attended Macroblock is predicted by the field interpolation mode and the interlacing phase of the attended field is different from the field selected for prediction, make a difference with the vector to that field.

Priority 4 When the previous Macroblock is not a motion compensated Macroblock, apply the above 1 to 3 to one Macroblock before. Added to this, the same reset rule as that of MPEG1 is applied to the reference motion vector.

Table 2-3 Priority of selection for subtracted motion vector

4) Coded block pattern

The pattern number defined by the following formula are coded by the VLC table shown in Table 7-3.

$$\text{Pattern No.} = 8 \times y0 + 4 \times y1 + 2 \times cr + cb$$

where y0, y1, cr, and cb give the value 1 when blocks Y0, Y1, Cr, and Cb are coded, and 0 when they are not coded, respectively.

5) DCT coefficient

DCT coefficients are 2-dimensional variable length coded in the form of zero run + non-zero coefficient (= (RUN, LEVEL) : called an event). There comes an EOB (= End of block) code at the end of each block. The VLC code word for EOB is also prepared in the VLC table. There are some difference in the way transmitting between Intra Macroblock case and Non-intra Macroblock case.

- Intra Macroblock case

DC components are transmitted as a difference to that of the previous block. Rules for how to set and reset the DC predictor is the same as that of MPEG1 SM3. AC components are transmitted by the 2-dimensional VLC for Intra AC coefficients.

- Non-intra Macroblock case

Two types of 2-dimensional VLC tables are switched for the first event and the others. The VLC table applied to events other than the first event is the same as that for Intra AC coefficients.

2.10 Rate control

2.10.1 Outline

The proposed rate control method consists of the following 3 layers.

1) Bit allocation for each GOP.
2) Bit allocation for each picture and update of the allocated number of bits.
3) Rate control in each picture using a hypothetical buffer.

A value called activity is calculated and used for rate control. The activity for an I-picture is the sum of the absolute values of the pixels subtracting the over-block mean value. The activity for a P or B-picture is the sum of the absolute values of the DCT coefficients of adaptive prediction error signal. The activity for an I-picture is calculated before coding an I-picture. The activity for a P or B-picture is calculated while coding, and the activity for the most recently coded picture of the same type is used for rate control.

2.10.2 Bit allocation for GOP

Rate control is carried out so that the number of generated bits within a GOP approaches the target value C_{GOP}. The leftover bits are reallocated to the next GOP. The number of allocated bits for the i-th GOP, $R_{GOP}[i]$, is calculated as follows:

$$R_{GOP}[i] = C_{GOP} + (R_{GOP}[i - 1] - G_{GOP}[i - 1])$$
$$C_{GOP} = R \times N / 60$$

where R is the coding rate (bits/second), N is the number of picture in a GOP, $R_{GOP}[i-1]$ and $G_{GOP}[i-1]$ are the number of allocated bits and generated bits in the (i-1)-th GOP, respectively.

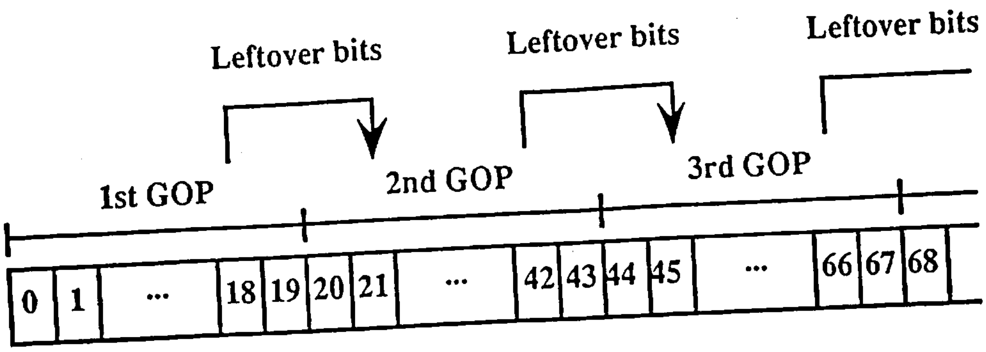


Fig. 2-16 Bit allocation for GOP

2.10.3 Bit allocation for each picture

2.10.3.1 Bit allocation for I-picture

The number of allocated bits for the first I-picture in a sequence, R_{I_0}, is calculated as follows:

$$R_{I\_0} = (4.28\times10^{-8} \times A_{I\_0} + 9.00\times10^{-2}) \times C_{GOP}$$

where A_{I_0} is the activity for the first I-picture.

The number of allocated bits for other I-pictures, R_I, is calculated as follows, so that the ratio of the average quantizer scale in P1 and P2-pictures to that in a I-picture approaches to the target ratio, K_{QI_P12}:

```
D_I_P12' = Q_I' - ( Q_P1' + Q_P2' ) / 2 / K_QI_P12
if( D_I_P12' >= 1 ) {
  R_I = G_I' × A_I / A_I' × Q_I' / ( Q_I' - 1 );    Q_I,S_first = Q_I' - 1;
} else if( D_I_P12' <= -1 ) {
  R_I = G_I' × A_I / A_I' × Q_I' / ( Q_I' + 1 );    Q_I,S_first = Q_I' + 1;
} else
  R_I = G_I' × A_I / A_I';
```

A_I and A_I' are the activities for the attended and the most recently coded I-picture respectively, G_I' is the number of generated bits in the most recently coded I-picture, Q_I', Q_{P1}' and Q_{P2}' are the averages of the quantizer scales in the most recently coded I, P1 and P2-pictures, respectively, and K_{QI_P12} is defined in Table 2-4. Q_{I,S_first} is the quantizer scale used in the first slice of the concerned I-picture, and it is used in rate control in the I-picture. The maximum value of R_I is limited to 40% of C_{GOP}.

2.10.3.2 Bit allocation for P0-picture

Bit allocation is not explicitly applied to a P0-picture. However, as will be mentioned later, the number of generated bits in a P0-picture is limited, so that the sum of the number generated in a P0-picture and that in the I-picture before the P0-picture does not exceed 50% of C_{GOP}.

2.10.3.3 Bit allocation for P1, P2, and B-pictures

The number of allocated bits for a P1, P2 or B-picture is determined as follows:

$$R_{P1} = (R_{GOP} - G_C) / (N_{P1} + K_{P1\_P2} \times N_{P2} + K_{P1\_B} \times N_B)$$
$$R_{P2} = K_{P1\_P2} \times R_{P1}$$
$$R_B = K_{P1\_B} \times R_{P1}$$

where G_C is the number of bits generated in pictures that are already coded in the GOP, N_{P1}, N_{P2}, and N_B are the number of P1, P2 and B-pictures that have not been coded in the GOP respectively, K_{P1_P2} and K_{P1_B} are the ratio of the number of allocated bits for the P2-picture to that for the P1 picture and the ratio of the number of allocated bits for the B-picture to that for the P1-picture, respectively. K_{P1_P2} and K_{P1_B} have initial values 0.750, 0.375, and are updated just after coding a B3-picture as follows.

K_{P1_P2} is updated by the following equation using the activities for the most recently coded P1 and P2-pictures, A_{P1}' and A_{P2}'.

$$K_{P1\_P2} = 1.85 \times A_{P2}' / A_{P1}' - 0.83$$

K_{P1_B} is updated by the following equations so that the average quantizer scale of a B-picture will be K_{QP12_B} times larger than those of P1 and P2-pictures.

$$K_{P1\_B} = G_{P1}' / G_B'$$

$$G_B' = \sum_{k=0}^{3} (1/4)^{D_{Bk}'} \times G_{Bk}' / \sum_{k=0}^{3} (1/4)^{D_{Bk}'}$$

$$D_{Bk}' = 0 \qquad k=0$$
$$= | Q_{B0}' - Q_{Bk}' | \qquad k=1,..3$$
$$Q_{Bop}' = (Q_{P1}' + Q_{P2}') / 2 \times K_{QP12\_B}$$

where G_{Bk}' is the number of generated bits in the most recently coded Bk-picture, Q_{P1}', Q_{P2}', and Q_{Bk}' are the average of the quantizer scales in P1, P2, and Bk-pictures respectively, and K_{QP12_B} is defined in Table 2-4.

Input sequence	K_{QI_P0}	K_{QI_P12}	K_{QP12_B}
"Mobile & calendar"	1.0	1.5	2.0
Other sequences	1.0	1.0	1.5

Table 2-4 Target quantizer scale ratio

2.10.4 Rate control in each picture

Rate control in each picture is carried out slice by slice, using a hypothetical buffer. The quantizer scale used in the first slice of each picture is summarized in Table 2-5.

I:	$0.9 \times A_{I\_o} / R_{I\_o}$	(First I-picture in sequence)
	Q_{I,S_first}	(Other I-Pictures)
P0:	$Q_I' \times K_{QI\_P0}$	
P1:	$Q_{P0}' \times K_{QI\_P12} / K_{QI\_P0}$	(First P1-picture in sequence)
	$Q_{P1}' \times G'_{P1} / R_{P1}$	(Other P1-pictures)
P2:	Q_{P1}'	
B0:	$(Q_{P1}' + Q_{P2}') / 2 \times K_{QP12\_B}$	
B1:	Q_{B0,S_end}	
B2:	Q_{B1,S_end}	
B3:	Q_{B2,S_end}	

Table 2-5 Initial value of quantizer scale

2.10.4.1 Rate control in I, P1, and P2-pictures

The content of the hypothetical buffer is set to zero before coding each picture. The generated bits in each slice, whose number is G[slice], are accumulated in the buffer, and the allocated bits for the slice, whose number is R[slice], are taken from the buffer. R[slice] is determined so that the allocated bits for the picture, whose number is R_{pic}, are allocated to each slice proportionally to the activity for the slice, A[slice].

$$R[slice] = R_{pic} \times A[slice] \Big/ \sum_{m=1}^{NUM\_SLICE} A[m]$$

where NUM_SLICE is the number of slices in a picture. As mentioned above, the activity for an I-picture is calculated before coding the I-picture, and the activities for other pictures are those calculated while coding. The buffer content B[slice] is referenced slice by slice. If B[slice] is larger (smaller) than both a threshold T (-T) and the buffer content at the previous slice, B[slice-1], then the quantizer scale Qs is increased (decreased) by one. Qs is limited to the range from 1 to 31. These processes are summarized as follows:

```
B[0] = 0;
T = R_pic / NUM_SLICE × 0.5;
for(slice = 1; slice < NUM_SLICE; slice++) {
   /* Coding one slice */
  B[slice] = B[slice - 1] + G[slice] - R[slice];
  if( B[slice] > T && B[slice] > B[slice - 1] && Qs < 31)  Qs += 1;
  else if(B[slice] < -T && B[slice] < B[slice - 1] && Qs > 1)  Qs -= 1;
}
```

In addition, if the number of generated bits in an I-picture exceeds 40% of C_{GOP}, or the content of the output data buffer exceeds 98% of its size, all coefficients will be set to 0 so that no codes will be generated.

2.10.4.2 Rate control in P0-picture

A hypothetical buffer is also used in coding a P0-picture. However, its purpose is to limit the maximum number of generated bits, so that the sum of generated bits in I and P0-pictures does not exceed 50% of C_{GOP}. Therefore, the number of taken bits from the buffer at each slice is set to be one NUM_SLICE-th of the usable number of bits for the P0-picture. If the buffer content exceeds a threshold T, which is equal to the number of taken bits from the buffer, the quantizer scale is increased by one. These are summarized as follows:

```
B[0] = 0;
T = (C_GOP × 0.49 - GI') / NUM_SLICE;
for(slice = 1; slice < NUM_SLICE; slice++) {
   /* Coding one slice */
  B[slice] = B[slice - 1] + G[slice] - T;
  if(B[slice] > T && Qs < 31) Qs += 1;
}
```

In addition, if the sum of generated bits in I and P0-pictures exceeds 49% of C_{GOP}, or the content of the output data buffer exceed 98% of its size, then the mode of all Macroblocks will be set to the "skipped" mode so that no codes will be generated.

2.10.4.3 Rate control in B-picture

The same control rule as that in P1 and P2-pictures is applied except for the following two points.

1) The quantizer scale is updated every 10 slices.
2) The quantizer scale is updated whenever the buffer content is larger (smaller) than the threshold T (-T) even if the buffer content is smaller (larger) than that at the previous slice.

These are summarized as follows:

```
B[0] = 0;
T = R_pic / NUM_SLICE × 1.5;
for( slice = 1; slice < NUM_SLICE; slice++) {
  /* Coding one slice */
  B[slice] = B[slice - 1] + G[slice] - R[slice];
  if(slice % 10 == 0)
    if(B[slice] > T && Qs < 31) Qs += 1;
    else if(B[slice] < -T && Qs > 1) Qs -= 1;
}
```

In addition, if the content of the output data buffer exceeds 98% of its size, then the mode of all Macroblocks will be set to the "skipped" mode so that no codes will be generated.

2.10.5 Rate control after scene change

The number of generated bits in a P-picture after scene change is much larger than those in other P-pictures. Therefore, the following rules are exceptionally applied to rate control when a scene change occurs.

It is determined that a scene change has occurred if more than 50 % of the Macroblocks in the first four slices in a P1-picture are coded by the Intra mode. The quantizer scale in a P1-picture where a scene change has been detected is limited to the quantizer scale at the first slice in the P1-picture + 3, and the quantizer scale in the next P2-picture is fixed to its initial value defined in Table 2-5. The numbers of allocated bits for remaining P1, P2, and B-pictures within a GOP are determined as follows, so that the part of bits for the next GOP can be used for them:

$$R_{P1} = (R_{GOP} - G_C + C_{GOP} - G_I' \times A_{P1\_scene\_change} / A_I' - G_{P0}' \times A_{P2\_scene\_change} / A_{P0}') / ((N_{P1} + 3) + K_{P1\_P2} \times (N_{P2} + 3) + K_{P1\_B} \times (N_B + 16))$$

$$R_{P2} = K_{P1\_P2} \times R_{P1}$$

$$R_B = K_{P1\_B} \times R_{P1}$$

where G_I' and G_{P0}' are the number of generated bits in the most recently coded I and P0-pictures, respectively.

3. Specification for coded bit stream

3.1 Bit stream syntax specification

3.1.1 Start codes

name	hexadecimal value
picture_start_code	00000100
slice_start_codes (including slice_vertical_positions)	00000101 through 000001AF
reserved	000001B0
reserved	000001B1
user_data_start_code	000001B2
sequence_header_code	000001B3
sequence_error_code	000001B4
extension_start_code	000001B5
reserved	000001B6
sequence_end_code	000001B7
group_start_code	000001B8
system start codes	000001B9 through 000001FF

3.1.2 Definition of next_start_code function

```
next_start_code() {
  while ( !bytealigned() )
    zero_bit                                          1        "0"
  while ( nextbits() != '0000 0000 0000 0000
                              0000 0001' )
    zero_byte                                         8        "00000000"
  }
```

3.1.3 Video sequence layer

```
video_sequence() {
 next_start_code()
 do {
   sequence_header()
   do {
     group_of_pictures()
   } while ( nextbits() == group_start_code )
} while ( nextbits() == sequence_header_code )
sequence_end_code                                     32       bslbf
```

```
}
```

3.1.4 Sequence header

```
sequence_header() {
 sequence_header_code                          32        bslbf
 horizontal_size                               12        uimsbf
 vertical_size                                 12        uimsbf
 pel_aspect_ratio                              4         uimsbf
 picture_rate                                  4         uimsbf
 bit_rate                                      18        uimsbf
 marker_bit                                    1         "1"
 vbv_buffer_size                               10        uimsbf
 constrained_parameter_flag                    1
 load_intra_quantizer_matrix                   1
 if ( load_intra_quantizer_matrix )
   intra_quantizer_matrix[64]                  8*64      uimsbf
 load_non_intra_quantizer_matrix               1
 if ( load_non_intra_quantizer_matrix )
   non_intra_quantizer_matrix[64]              8*64      uimsbf
 next_start_code()
 if (nextbits() == extension_start_code ) {
   extension_start_code                        32        bslbf
   while ( nextbits () != '0000 0000 0000 0000 0000
                                   0001' ) {
     sequence_extension_data                   8
   }
   next_start_code()
 }
 if (nextbits() == user_data_start_code ) {
   user_data_start_code                        32        bslbf
   while ( nextbits() != '0000 0000 0000 0000 0000
                                   0001' ) {
     user_data                                 8
   }
   next_start_code()
 }
}
```

3.1.5 Group of pictures layer

```
group_of_pictures() {
     group_start_code                          32 bits   bslbf
     time_code                                 25
     closed_gop                                1
     broken_ link                              1
     next_start_code()
```

```
    if ( nextbits() == extension_start_code ) {
        extension_start_code                                   32      bslbf
        while ( nextbits() != '0000 0000 0000 0000
                                    0000 0001' ) {
            group_extension_data                               8
        }
        next_start_code()
    }
    if ( nextbits() == user_data_start_code ) {
        user_data_start_code                                   32      bslbf
        while ( nextbits() != '0000 0000 0000 0000
                                    0000 0001' ) {
            user_data                                          8
        }
        next_start_code()
    }
    do {
        picture()
    } while ( nextbits() == picture_start_code )
}
```

3.1.6 Picture layer

```
picture() {
    picture_start_code                                     32 bits   bslbf
    temporal_reference                                     10        uimsbf
    picture_coding_type                                    3         uimsbf
    vbv_delay                                              16        uimsbf
    if ( picture_coding_type >= 5 ||
            picture_coding_type == 3 ) {
        full_pel_forward_vector                            1
        forward_f                                          3         uimsbf
    }
    if ( picture_coding_type == 3 ||
            picture_coding_type == 7 ) {
        full_pel_backward_vector                           1
        backward_f                                         3
    }
    while ( nextbits() == '1' ) {
        extra_bit_picture                                  1         "1"
        extra_information_picture                          8
    }
    extra_bit_picture                                      1         "0"
    next_start_code()

    if (nextbits() == extension_start_code ) {
        extension_start_code                               32        bslbf
        while ( nextbits() != '0000 0000 0000 0000
```

```
                                    0000 0001' ) {
        picture_extension_data                          8
      }
    next_start_code()
    }
  if ( nextbits() == user_data_start_code ) {
    user_data_start_code                                32          bslbf
    while ( nextbits() != '0000 0000 0000 0000
                                    0000 0001' ) {
                                                        8
        user_data
      }
    next_start_code()
    }
  do {
    slice()
  } while ( nextbits() == slice_start_code )
}
```

3.1.7 Slice layer

```
slice() {                                               32 bit      bslbf
    slice_start_code                                    5           uimsbf
    quantizer_scale
    while ( nextbits() == '1' ) {                       1           "1"
        extra_bit_slice                                 8
        extra_information_slice
    }                                                   1           "0"
    extra_bit_slice
    do {
    macroblock()
    } while ( nextbits() != '000 0000 0000 0000
                                    0000 0000' )
    next_start_code()
}
```

3.1.8 Macroblock layer

```
macroblock() {
    while ( nextbits() == '0000 0001 111' )             11 bits     vlclbf
        macroblock_stuffing
    while ( nextbits() == '0000 0001 000' )             11          vlclbf
        macroblock_escape                               1-11        vlclbf
    macroblock_address_increment                        1-6         vlclbf
    macroblock_type
    if ( macroblock_quant )                             5           uimsbf
        quantizer_scale
    if ( macroblock_motion_forward ) {
```

```
        if ( picture_coding_type != 5 )
            field_or_frame_forwad                          1
        if ( picture_coding_type == 6 ||
            picture_coding_type == 7 ||
            ( picture_coding_type == 3 &&
              field_or_frame_forward == 0 ) )
            select_mv_forward                              1
        motion_horizontal_forward                          1-14      vlclbf
        motion_vertical_forward                            1-14      vlclbf
        if ( field_or_frame_forward == 1 ) {
                dmv_horizontal_forward                     1-2       vlclbf
                dmv_vertical_forward                       1-2       vlclbf
        }
      }
    if ( macroblock_motion_backward ) {
        if ( picture_coding_type == 3 )
            field_or_frame_backward                        1
        if ( picture_coding_type == 3 &&
            field_or_frame_backward == 0 )
            select_mv_backward                             1
        motion_horizontal_backward                         1-14      vlclbf
        motion_vertical_backward                           1-14      vlclbf
        if ( field_or_frame_backward == 1 ) {
                dmv_horizontal_backward                    1-2       vlclbf
                dmv_vertical_backward                      1-2       vlclbf
        }
      }
    if ( macroblock_pattern)
        coded_block_pattern                                1-8       vlclbf
    for ( i=0; i<4; i++ )
        block( i )
    if ( picture_coding_type == 4 )
        end_of_macroblock                                  1         "1"
}
```

3.1.9 Block layer

```
block( i ) {
    if ( pattern_code[i] ) {
      if ( macroblock_intra ) {
        if ( i<2 ) {
            dct_dc_size_luminance                          2-7       vlclbf
            if(dct_dc_size_luminance != 0)
                dct_dc_differential                        1-8       uimsbf
        }
        else {
            dct_dc_size_chrominance                        2-8       vlclbf
            if(dct_dc_size_chrominance !=0)
```

dct_dc_differential	1-8	uimsbf
}		
}		
else {		
dct_coeff_first	2-28	vlclbf
}		
if (picture_coding_type != 4) {		
while (nextbits() != '010')		
dct_coeff_next	3-28	vlclbf
end_of_block	3	"010"
}		
}		
}		

3.2 Semantic meaning and use of retrieved data elements

3.2.1 Video sequence layer

The meaning of the following data element is the same as in MPEG1 C.D. on 5/31/91.

sequence_end_code

3.2.2 Sequence header

load_intra_quantizer_matrix -- This is a one-bit flag which is set to "1" if intra_quantizer_matrix follows. If it is set to "0" then the default values defined below are used until the next occurrence of the sequence header.

0	8	11	14	18	19	21	26
8	8	14	16	19	21	26	29
11	14	18	19	21	26	26	30
14	14	18	19	21	26	29	32
14	18	19	21	24	27	32	40
18	19	21	24	27	32	40	50
18	19	21	26	30	38	48	61
19	21	27	30	38	48	61	75

intra_quantizer_matrix -- This is a list of 64 8-bit unsigned integers. The new values, stored in the zigzag scanning order same as that in MPEG1 C.D., replace the default values. The value for intra_quant[0][0] shall always be 0. The new values shall be in effect until the next occurrence of a sequence header.

load_non_intra_quantizer_matrix -- This is a one-bit flag which is set to "1" if non_intra_quantizer_matrix follows. If it is set to "0" then the default values defined below are used until the next occurrence of the sequence header.

8	10	12	14	16	18	20	22
9	11	13	15	17	19	21	23
10	12	14	16	18	20	22	24
11	13	15	17	19	21	23	25
12	14	16	18	20	22	24	26
13	15	17	19	21	23	25	27
14	16	18	20	22	24	26	28
15	17	19	21	23	25	27	29

non_intra_quantizer_matrix -- This is a list of 64 8-bit unsigned integers. The new values, stored in the zigzag scanning order same as that in MPEG1 C.D., replace the default values. The new values shall be in effect until the next occurrence of a sequence header.

The meaning of the following data elements is the same as the MPEG1 C.D. on 5/31/91.

sequence_header_code
vertical_size
picture_rate
marker_bit
constrained_parameters_flag
sequence_extension_data
user_data
horizontal_size
pel_aspect_ratio
bit_rate
vbv_buffer_size
extension_start_code
user_data_start_code

In our simulation, the data elements mentioned above are set as follows :

horizontal_size -- 720.
vertical_size -- 240.
pel_aspect_ratio -- '1100', for CCIR601, 525 lines.
picture_rate .-- '1000', for 60 pictures/second.
bit_rate -- either 10000 (for 4 Mbits/sec.) or 22500 (for 9 Mbits/sec.).
vbv_buffer_size -- unused.
constrained_parameters_flag -- unused.

3.2.3 Group of pictures layer

The meaning of the following data elements is the same as in MPEG1 C.D. on 5/31/91.

group_start_code
closed_gop
extension_start_code
user_data_start_code
time_code
broken_link
group_extension_data
user_data

3.2.4 Picture layer

picture_coding_type -- The picture_coding_type identifies whether a picture is an intra-coded picture(I), predictive-coded picture(P0, P1, or P2), bidirectionally predictive-coded picture(B), or intra-coded with only dc coefficients (D) according to the following table. D-pictures shall never be included in the same video sequence as other picture coding types.

picture_coding_type	coding method
000	forbidden
001	intra-coded (I)
010	reserved
011	bidirectionally-predictive (B)
100	dc intra-coded (D)
101	predictive-coded (P0)
110	predictive-coded (P1)
111	predictive-coded (P2)

The meaning of the following data elements is the same as in MPEG1 C.D. on 5/31/91.

picture_start_code
temporal_reference
vbv_delay
full_pel_forward_vector
full_pel_backward_vector
extra_bit_picture
extra_information_picture
extension_start_code
picture_extension_data
user_data_start_code
user_data

The meaning of the following data elements is the same as in MPEG1 C.D. on 12/18/90.

forward_f
backward_f

In our simulation, the data elements mentioned above are set as follows :

vbv_delay -- unused.
full_pel_forward_vector -- 0.
full_pel_backward_vector -- 0.

3.2.5 Slice layer

quantizer_scale -- An unsigned integer in the range 1 to 31 is used to scale the reconstruction level of the retrieved DCT coefficient levels. The decoder shall use this value in the slice if another quantizer_scale is not encountered at the macroblock layer.

The meaning of the following data elements is the same as in MPEG1 C.D. on 5/31/91.

slice_start_code
slice_vertical_position
extra_bit_slice
extra_information_slice

3.2.6 Macroblock layer

quantizer_scale -- An unsigned integer in the range 1 to 31 is used to scale the reconstruction level of the retrieved DCT coefficient levels. The decoder shall use this value only one macroblock. The presence of a quantizer_scale is determined from the macroblock_type.

field_or_frame_forward -- This is a one-bit flag for selecting the interpolation mode for a forward reference picture. This flag is set to 0 if the picture being decoded shall be reconstructed by referencing the picture interpolated by the field mode. This flag is set to 1 if the picture being decoded shall be reconstructed by referencing a picture interpolated by the frame mode. If the picture_coding_type is a P0-picture, this flag is absent and shall be set to 0.

select_mv_forward -- This is a one-bit flag for selecting a forward reference picture. This flag is set to 0 if the reference picture reconstructed by forward motion vector is an even field picture. This flag is set to 1 if the reference picture reconstructed by the forward motion vector is an odd field picture. If the picture_coding_type is a P0-picture, this flag is absent and shall be set to 0. If the picure_coding_type is a B-picture and the field_or_frame_forward is 1, this flag is absent and shall be set so that the picture selected by this flag has the same interlacing phase.

motion_horizontal_forward -- Forward horizontal motion vector for a selected field picture coded in half pel units according to Table 7-4 in Section 7.

motion_vertical_forward -- Forward vertical motion vector for a selected field picture coded in half pel units according to Table 7-4 in Section 7.

dmv_horizontal_forward -- Difference between a horizontal motion vector reconstructed from a forward horizontal motion vector for the selected field picture and a forward horizontal motion vector for the not selected field picture coded in one pel units according to Table 7-4g in Section 7. This element is present only if the field_or_frame_forward flag is set to 1.

dmv_vertical_forward -- Difference between a vertical motion vector reconstructed from a forward vertical motion vector for the selected field picture and a forward vertical motion vector for the not selected field picture coded in one pel units according to Table 7-4g in Section 7. This element is present only if the field_or_frame_forward flag is set to 1.

field_or_frame_backward -- This is a one-bit flag for selecting the interpolation mode for a backward reference picture. This flag is set to 0 if the picture being decoded shall be reconstructed by referencing a picture interpolated by the field mode. This flag is set to 1 if the picture being decoded shall be reconstructed by referencing a picture interpolated by the frame mode. If the picture_coding_type is a P2-picture, this flag is absent and shall be set to 0.

select_mv_backward -- This is a one-bit flag for selecting a backward reference picture. This flag is set to 0 if a reference picture reconstructed by a backward motion vector is an even field picture. This flag is set to 1 if the reference picture reconstructed by a backward motion vector is an odd filed picture. If the picture_coding_type is a P2-picture, this flag is absent and shall be set to 0. If the picture_coding_type is a B-picture and field_or_frame_backward is 1, this flag is absent and shall be set so that the picture selected by this flag has the same interlacing phase.

motion_horizontal_backward -- Backward horizontal motion vector for a selected field picture coded in half pel units according to Table 7-4 Section 7.

motion_vertical_backward -- Backward vertical motion vector for a selected field picture coded in half pel units according to Table 7-4 in Section 7.

dmv_horizontal_backward -- Difference between a horizontal motion vector reconstructed from a backward vertical motion vector for the selected field picture and a backward horizontal motion vector for the not selected field picture coded in one pel units according to Table 7-4g in Section 7. This element is present only if the field_or_frame_backward flag is set to 1.

dmv_vertical_backward -- Difference between a vertical motion vector reconstructed from a backward vertical motion vector for the selected field picture and a backward vertical motion vector for the not selected field picture coded in one pel units according to Table 7-4g in Section 7. This element is present only if the field_or_frame_backward flag is set to 1.

coded_block_pattern -- The variable cbp is derived from the coded_block_pattern using the variable length code Table 7-3 in Section 7. Then, the pattern_code[i] for i=0 to 3 is derived from cbp using the following:

```
pattern_code[i] = 0;
if ( cbp & (1<<(3-i)) ) pattern_code[i] = 1;
if ( macroblock_intra ) pattern_code[i] = 1 ;
```

pattern_code[0] -- If 1, then the left luminance block is to be received in this macroblock.

pattern_code[1] -- If 1, then the right luminance block is to be received in this macroblock.

pattern_code[2] -- If 1, then the chrominance difference block Cb is to be received in this macroblock.

pattern_code[3] -- If 1, then the chrominance difference block Cr is to be received in this macroblock.

The meaning of the following data elements is the same as in MPEG1 C.D. on 5/31/91.

macroblock_stuffing
macroblock_address_increment
end_of_macroblock
macroblock_escape
macroblock_type

The meaning of the following data elements is the same as in MPEG1 C.D. on 12/18/90.

motion_horizontal_forward
motion_horizontal_backward
motion_vertical_forward
motion_vertical_backward

3.2.7 Block layer

dct_coeff_first -- A variable length code according to Tables 7-5c through 7-5g in Section 7 for the first coefficient. The zigzag-scanned quantized dct coefficient list is updated as follows.

```
i = run ;
if ( s == 0 )   dct_zz[i] = level ;
if ( s == 1 )   dct_zz[i] = -level ;
```

The terms dct_coeff_first and dct_coeff_next are the run-length encoded and dct_zz[i], i>0 shall be set to zero initially. A variable length code according to Tables 7-5c through 7-5g and 7-5m is used to represent the run and level of the DCT coefficients.

dct_coeff_next -- A variable length code according to Tables 7-5h through 7-5m in Section 7 for coefficients following the first retrieved. The zig-zag scanned quantized dct coefficient list is updated as follows.

```
i = i + run + 1 ;
if ( s == 0 )   dct_zz[i] = level ;
if ( s == 1 )   dct_zz[i] = -level;
```

If macroblock_intra == 1, then the term i shall be set to zero before the first dct_coeff_next of the block.

The meaning of the following data elements is the same as in MPEG1 C.D. on 5/31/91.

dct_dc_size_luminance
dct_dc_size_chrominance
dct_dc_differential
end_of_block

3.3. The decoding process

3.3.1 Intra-coded macroblocks

All blocks are intra-coded and transmitted in the I-pictures . Some macroblocks may be intra-coded as identified by macroblock_type in the P0-pictures, P1-pictures, P2-pictures and B-pictures . Thus, macroblock_intra identifies the intra-coded macroblocks.

The discussion of semantics has defined mb_row and mb_column, which locate the macroblock in the picture. The definitions of dct_dc_differential and dct_coeff_next have also defined the zigzag-scanned quantized dct coefficient list, dct_zz[]. Each dct_zz[] is located in the macroblock as defined by pattern_code[].

Let us define dct_recon[8][8] to be the matrix of the reconstructed dct coefficients, where the first index identifies the row and the second the column of the matrix. Define dct_dc_y_past, dct_dc_cb_past, and dct_dc_cr_past to be the dct_recon[0][0] of the most recently decoded intra-coded Y, Cb, and Cr blocks respectively. The predictors dct_dc_y_past, dct_dc_cb_past, and dct_dc_cr_past are all reset at the start of a slice and at non-intra-coded macroblocks (including skipped macroblocks) to the value 128.

Define intra_quant[8][8] to be the intra quantizer matrix specified in the sequence header. Note - intra_quant[0][0] is used in the inverse quantizer calculations for simplicity of description, but the result is overwritten by the subsequent calculation for the dc coefficient.

Define non_intra_quant[8][8] to be the non-intra quantizer matrix specified in the sequence header.

Define scan[4][8][8] to be the matrix defining the zigzag scanning sequence.

The first 8x8 elements of the matrix (scan[0][][]) are used for the intra-coded luminance block and are defined as follows :

0	2	6	12	20	28	34	50
1	4	11	19	27	33	35	51
3	8	17	25	31	36	49	52
5	10	18	26	32	37	48	53
7	15	23	30	39	38	47	54
9	16	24	40	45	46	55	60
13	21	29	41	44	56	59	61
14	22	42	43	57	58	62	63

The second 8x8 elements of the matrix (scan[1][][]) are used for the intra-coded chrominance block and are defined as follows :

0	1	5	6	14	15	27	28
2	4	7	13	16	26	29	42
3	8	12	17	25	30	41	43
9	11	18	24	31	40	44	53

10	19	23	32	39	45	52	54
20	22	33	38	46	51	55	60
21	34	37	47	50	56	59	61
35	36	48	49	57	58	62	63

The third 8x8 elements of the matrix (scan[2][][]) are used for the non-intra-coded luminance block and are defined as follows :

0	8	16	24	32	40	48	56
1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63

The fourth 8x8 elements of the matrix (scan[3][][]) are used for the non-intra-coded chrominance block and are defined as follows :

0	1	2	3	4	7	15	34
5	6	8	10	14	26	35	56
9	11	13	16	25	36	43	58
12	18	17	24	30	42	50	59
19	23	27	29	41	48	52	60
20	28	31	37	44	49	54	61
21	32	38	40	46	51	55	62
22	33	39	45	47	53	57	63

Define past_intra_address as the macroblock_address of the most recently retrieved intra-coded macroblock within the slice. It is reset to -2 at the beginning of each slice.

Then dct_recon[8][8] is computed by any means equivalent to the following procedure for the first luminance block:

```
for (m=0; m<8; m++) {
        for (n=0; n<8; n++) {
                i = scan[0][m][n] ;
                dct_recon[m][n] = ( 2 * dct_zz[i] * ( 64 + quantizer_scale
                                                   * intra_quant[m][n] ) ) / 16 ;
                if ( ( dct_recon[m][n] & 1 ) == 0 )
                        dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n])
;

                if (dct_recon[m][n] > 2047)  dct_recon[m][n] = 2047 ;
                if (dct_recon[m][n] < -2048)  dct_recon[m][n] = -2048 ;
        }
}
dct_recon[0][0] = dct_zz[0] * 8 ;
if ( ( macroblock_address - past_intra_address > 1) )
        dct_recon[0][0] = 128 * 8 + dct_recon[0][0] ;
```

```
else
        dct_recon[0][0] = dct_dc_y_past + dct_recon[0][0] ;
dct_dc_y_past = dct_recon[0][0] ;
```

For the second luminance block in the macroblock, in the order of the pattern_code list:

```
for (m=0; m<8; m++) {
        for (n=0; n<8; n++) {
                i = scan[0][m][n] ;
                dct_recon[m][n] = ( 2 * dct_zz[i] * ( 64 + quantizer_scale
                                                  * intra_quant[m][n] ) ) / 16 ;
                if ( ( dct_recon[m][n] & 1 ) == 0 )
                        dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n])
;
                if (dct_recon[m][n] > 2047)  dct_recon[m][n] = 2047 ;
                if (dct_recon[m][n] < -2048)  dct_recon[m][n] = -2048 ;
                }
        }
dct_recon[0][0] = dct_dc_y_past + dct_zz[0] * 8 ;
dct_dc_y_past = dct_recon[0][0] ;
```

For the chrominance Cb block,:

```
for (m=0; m<8; m++) {
        for (n=0; n<8; n++) {
                i = scan[1][m][n] ;
                dct_recon[m][n] = ( 2 * dct_zz[i] * ( 64 + quantizer_scale
                                                  * intra_quant[m][n] ) ) / 16 ;
                if ( ( dct_recon[m][n] & 1 ) == 0 )
                        dct_recon[m][n] = dct_recon[m][n]-Sign(dct_recon[m][n]) ;
                if (dct_recon[m][n] > 2047)  dct_recon[m][n] = 2047 ;
                if (dct_recon[m][n] < -2048)  dct_recon[m][n] = -2048 ;
        }
}
dct_recon[0][0] = dct_zz[0] * 8 ;
if (  ( macroblock_address - past_intra_address > 1) )
        dct_recon[0][0] = 128 * 8 + dct_recon[0][0] ;
else
        dct_recon[0][0] = dct_dc_cb_past + dct_recon[0][0] ;
dct_dc_cb_past = dct_recon[0][0] ;
```

For the chrominance Cr block, :

```
for (m=0; m<8; m++) {
        for (n=0; n<8; n++) {
                i = scan[1][m][n] ;
                dct_recon[m][n] = ( 2 * dct_zz[i] * ( 64 + quantizer_scale
                                                  * intra_quant[m][n] ) ) / 16 ;
                if ( ( dct_recon[m][n] & 1 ) == 0 )
                        dct_recon[m][n] = dct_recon[m][n]-Sign(dct_recon[m][n]) ;
                if (dct_recon[m][n] > 2047)  dct_recon[m][n] = 2047 ;
```

```
                if (dct_recon[m][n] < -2048) dct_recon[m][n] = -2048 ;
            }
    }
    dct_recon[0][0] = dct_zz[0] * 8 ;
    if ( ( macroblock_address - past_intra_address > 1) )
            dct_recon[0][0] = 128 * 8 + dct_recon[0][0] ;
    else
            dct_recon[0][0] = dct_dc_cr_past + dct_recon[0][0] ;
    dct_dc_cr_past = dct_recon[0][0] ;
```

After all the blocks in the macroblock are processed:

```
    past_intra_address = macroblock_address ;
```

Once the dct coefficients are reconstructed, the inverse DCT transform is applied to obtain the inverse transformed pel values in the range [-256, 255]. These pel values must be clipped to the range [0, 255] and are placed in the luminance and chrominance matrices in the positions defined by mb_row , mb_column, and the pattern_code list.

3.3.2 Predictive-coded macroblocks in P0- and P1-pictures

Predictive-coded macroblocks in P0- and P1-pictures are decoded in two steps. First, the value of the forward motion vector for the macroblock is reconstructed and a prediction macroblock is formed, as detailed below. Second, the DCT coefficient information stored for some or all of the blocks is decoded, inverse DCT transformed, and added to the prediction macroblock.

Let **recon_right_for[]** and **recon_down_for[]** be the reconstructed horizontal and vertical components of the motion vector for the current macroblock, and **recon_right_for_prev[]** and **recon_down_for_prev[]** be the reconstructed motion vector for the previous predictive-coded macroblock. The index of the matrix may be either 0 or 1. If the index equals 0, the motion vectors are used for reconstructing the even field reference picture. If the index equals 1, the motion vectors are used for reconstructing an odd field reference picture. If this is the first macroblock in the slice, or if the last macroblock contained no motion vector information (either because it was skipped or macroblock_motion_forward was zero), then recon_right_for_prev[] and recon_down_for_prev[] shall be set to zero.

If no forward motion vector data exists for the current macroblock (either because it was skipped or macroblock_motion_forward == 0), the motion vectors shall be set to zero.

If forward motion vector data exist for the current macroblock, the following procedure is used to reconstruct the motion vector horizontal and vertical components. Decoded values **right_little, right_big, down_little** and **down_big** are found from an appropriate Table 7-4a through 7-4f in Section 7.

Let **fi_or_fr_for_prev** be the flag of the interpolation mode a the previous-coded macroblock. If this is the first macroblock in the slice, or if the last macroblock decoded contained no motion vector information, then fi_or_fr_for_prev shall be set to zero.

Let **sel_mv_for_prev** be the flag of select_mv_forward for a previous predictive-coded macroblock. If this is the first macroblock in the slice, or if the last macroblock decoded contained no motion vector information, then sel_mv_for_prev shall be set to zero.

Let **dist[0]** be the distance between an even field reference picture and a current decoding picture. Let dist[1] be the distance between an odd field reference picture and a current decoding picture.

Then the motion vector in half-pel units is reconstructed as follows:

```
max = ( 16 * forward_f ) - 1 ;
min = ( -16 * forward_f ) ;

if ( fi_or_fr_for_prev == 0 ) {
        new_vector = recon_right_for_prev[sel_mv_for_prev] + right_little ;
        if ( new_vector <= max && new_vector >= min )
                recon_right_for[select_mv_forward]
                        = recon_right_for_prev[sel_mv_for_prev] + right_little ;
        else
                recon_right_for[select_mv_forward]
                        = recon_right_for_prev[sel_mv_for_prev] + right_big ;
        recon_right_for_prev[select_mv_forward]
                = recon_right_for[select_mv_forward] ;

        new_vector = recon_down_for_prev[sel_mv_for_prev] + down_little ;
        if ( new_vector <= max && new_vector >= min )
                recon_down_for[select_mv_forward]
                        = recon_down_for_prev[sel_mv_for_prev] + down_little ;
        else
                recon_down_for[select_mv_forward]
                        = recon_down_for_prev[sel_mv_for_prev] + down_big ;
        recon_down_for_prev[select_mv_forward]
                = recon_down_for[select_mv_forward] ;
}
else {
        new_vector = recon_right_for_prev[select_mv_forward] + right_little ;
        if ( new_vector <= max && new_vector >= min )
                recon_right_for[select_mv_forward]
                        = recon_right_for_prev[select_mv_forward] + right_little ;
        else
                recon_right_for[select_mv_forward]
                        = recon_right_for_prev[select_mv_forward] + right_big ;
        recon_right_for_prev[select_mv_forward]
                = recon_right_for[select_mv_forward] ;

        new_vector = recon_down_for_prev[select_mv_forward] + down_little ;
```

```
            if ( new_vector <= max && new_vector >= min )
                  recon_down_for[select_mv_forward]
                        = recon_down_for_prev[select_mv_forward] + down_little
;
            else
                  recon_down_for[select_mv_forward]
                        = recon_down_for_prev[select_mv_forward] + down_big ;
            recon_down_for_prev[select_mv_forward]
                  = recon_down_for[select_mv_forward] ;
      }

      if ( field_or_frame_forward == 1 ) {
            recon_right_for[!select_mv_forward]
                  = 2 * ( ( (double) recon_right_for[select_mv_forward] / 2.0 *
                        dist[!select_mv_forward] / dist[select_mv_forward] ) / 1
                              - dmv_horizontal_forward ) ;
            recon_down_for[!select_mv_forward]
                  = 2 * ( ( (double) recon_down_for[select_mv_forward] / 2.0 *
                        dist[!select_mv_forward] / dist[select_mv_forward] ) / 1
                              - dmv_vertical_forward ) ;
            recon_right_for_prev[!select_mv_forward]
                  = recon_right_for[!select_mv_forward] ;
            recon_down_for_prev[!select_mv_forward]
                  = recon_down_for[!select_mv_forward] ;
      }

      if ( select_mv_forward == 0 && ( dist[0] % 2 == 1 ) )
            recon_down_for[select_mv_forward] ++ ;
      if ( select_mv_forward == 1 && ( dist[0] % 2 == 0 ) )
            recon_down_for[select_mv_forward] -- ;
      fi_or_fr_for_prev = field_or_frame_forward ;
      sel_mv_for_prev = select_mv_forward ;
```

The motion vectors in integer pel units for the macroblock, right_for[] and down_for[], and the half pel unit flags, right_half_for[] and down_half_for[], are computed as follows:

for luminance	for chrominance
right_for[] = recon_right_for[] >> 1 ;	right_for[] = (recon_right_for[] / 2) >> 1 ;
down_for[] = recon_down_for[] >> 1 ;	down_for[] = (recon_down_for[] / 2) >> 1 ;
right_half_for[] = recon_right_for[] - 2*right_for[] ;	right_half_for[] = recon_right_for[]/2 - 2*right_for[] ;
down_half_for[] = recon_down_for[] - 2*down_for[] ;	down_half_for[] = recon_down_for[]/2 - 2*down_for[];

If the reference picture is of a field interpolation mode, the index [] of the matrices mentioned above takes only select_mv_forward. If the reference picture is of a frame interpolation mode, the index [] of the matrices mentioned above takes both select_mv_forward and !select_mv_forward.

A positive value for a reconstructed horizontal motion vector (right_for[]) indicates that the referenced area of the past picture is to the right of the macroblock in the coded picture.

A positive value for a reconstructed vertical motion vector (down_for[]) indicates that the referenced area of the past picture is below the macroblock in the coded picture.

Defining pel_past[][][] as the pels of the past picture referenced by the forward motion vector, and pel[][][] as the pels of one field of the picture being decoded, then:

```
    if ( ! right_half_for[] && ! down_half_for[] )
        pel[][i][j] = pel_past[][i+down_for][j+right_for] ;

    if ( ! right_half_for[] &&  down_half_for[] )
        pel[][i][j] = ( pel_past[][i+down_for][j+right_for] +
                        pel_past[][i+down_for+1][j+right_for] ) // 2
;

    if (  right_half_for[] && ! down_half_for[] )
        pel[][i][j] = ( pel_past[][i+down_for][j+right_for] +
                        pel_past[][i+down_for][j+right_for+1] ) // 2
;

    if (  right_half_for[] &&  down_half_for[] )
        pel[][i][j] = ( pel_past[][i+down_for][j+right_for] +
                        pel_past[][i+down_for+1][j+right_for] +
                        pel_past[][i+down_for][j+right_for+1] +
                        pel_past[][i+down_for+1][j+right_for+1] ) // 4 ;
```

If the reference picture is of a field interpolation mode, the first index of pel_past[][][] and pel[][][] take only select_mv_forward. If the reference picture is frame interpolation mode, the first index of pel_past[][][] and pel[][][] takes both select_mv_forward and !select_mv_forward.

Define pel_new[][] as the pels of the picture being decoded, then:

```
    if ( field_or_frame_forward == 0 )
        pel_new[i][j] = pel[select_mv_forward][i][j] ;
    else
        pel_new[i][j] = ( pel[select_mv_forward][i][j] +
                          pel[!select_mv_forward][i][j] ) // 2 ;
```

The DCT coefficients for each block present in the macroblock are reconstructed by:

```
    for ( m=0; m<8; m++ ) {
```

```
            for ( n=0; n<8; n++ ) {
                  i = scan[][m][n] ;
                  dct_recon[m][n] = ( 2 * dct_zz[i] * ( 16 + quantizer_scale
                                                  * non_intra_quant[m][n] ) ) / 16 ;
                  if ( ( dct_recon[m][n] & 1 ) == 0 )
                        dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n])
;
                  if (dct_recon[m][n] > 2047)  dct_recon[m][n] = 2047 ;
                  if (dct_recon[m][n] < -2048)  dct_recon[m][n] = -2048 ;
                  if ( dct_zz[i] == 0 )
                        dct_recon[m][n] = 0 ;
            }
      }
```

If the reconstructed block is a luminance block, then the first index of scan[][][] shall be 2. If the reconstructed block is a chrominance block, then the first index of scan[][][] shall be 3.

NOTE - dct_recon[m][n] = 0 (for all m, n) in skipped macroblocks and when pattern[i] == 0.

Once the dct coefficients are reconstructed, the inverse DCT transform is applied to obtain the inverse transformed pel values in the interval [-256, 255]. The inverse DCT pel values are added to the pel_new[i][j] which were computed above using the motion vectors, with the result of the addition being limited to the interval [0,255]. The location of the pels is determined from mb_row, mb_column and the pattern_code list.

3.3.3 Predictive-coded macroblocks in P2- and B-pictures

The predictive-coded macroblocks in P2- and B-Pictures are decoded in four steps.

First, the value of a forward motion vector for a macroblock is reconstructed from the retrieved forward motion vector information, and the forward motion vector reconstructed for the previous macroblock. However, for P2- and B-coded pictures, the previous reconstructed motion vectors are reset only for the first macroblock in a slice and when the last decoded macroblock was an intra-coded macroblock. If no forward motion vector data exists for the current macroblock, the motion vectors are obtained by

```
recon_right_for[] = recon_right_for_prev[],
recon_down_for[] = recon_down_for_prev[].
```

Second, the value of the backward motion vector for the macroblock is reconstructed from the retrieved backward motion vector information and the backward motion vector reconstructed for the previous macroblock using the same procedure as for calculating the forward motion vector in P2- and B-pictures. In the case of P2-picture decoding, the forward motion vector is used for the far picture, and the backward motion vector is used for the near picture.

The following variables result from applying the algorithm in clause 3.3.2, modified as described in the previous two paragraphs:

right_for[], right_half_for[], down_for[], down_half_for[]
right_back[], right_half_back[], down_back[], down_half_back[]

which define the integral and half pel value of the rightward and downward components of the forward motion vector (which references the far picture in P2-picture and the past picture in B-picture) and the backward motion vector (which references the near picture in P2-picture and the future picture in B-picture).

Third, the pels of the decoded picture are calculated. If only forward motion vector information was retrieved for the macroblock, then pel_new[][] of the decoded picture is calculated according to the formulas in the predictive-coded macroblock section. If only backward motion vector information was retrieved for the macroblock, then pel_new[][] of the decoded picture is calculated according to the formulas in the predictive-coded macroblock section, with "back" replacing "for", and "pel_future[][][]" replacing "pel_past[][][]". If both forward and backward motion vectors information are retrieved, then let pel_new_for[][] be the value calculated from the past picture by using the reconstructed forward motion vector, and let pel_new_back[][] be the value calculated from the future picture by using the reconstructed backward motion vector. Then the value of pel_new[][] is calculated by:

```
pel_new[][] = ( pel_new_for[][] + pel_new_back[][] ) // 2 ;
```

Fourth, the DCT coefficients for each block present in the macroblock are reconstructed by:

```
for ( m=0; m<8; m++ ) {
        for ( n=0; n<8; n++ ) {
                i = scan[][m][n] ;
                dct_recon[m][n] = ( 2 * dct_zz[i] * ( 16 + quantizer_scale
                                        * non_intra_quant[m][n] ) ) / 16 ;
                if ( ( dct_recon[m][n] & 1 ) == 0 )
                        dct_recon[m][n] = dct_recon[m][n] - Sign(dct_recon[m][n])
;
                if (dct_recon[m][n] > 2047)  dct_recon[m][n] = 2047 ;
                if (dct_recon[m][n] < -2048)  dct_recon[m][n] = -2048 ;
                if ( dct_zz[i] == 0 )
                        dct_recon[m][n] = 0 ;
        }
}
```

If the reconstructed block is a luminance block, then the first index of scan[][][] shall be 2. If the reconstructed block is a chrominance block, then the first index of scan[][][] shall be 3.

NOTE - dct_recon[m][n] = 0 (for all m, n) in skipped macroblocks and when pattern[i] == 0.

Once the dct coefficients are reconstructed, the inverse DCT transform is applied to obtain the inverse transformed pel values in the range [-256, 255]. The inverse DCT pel values are added to pel_new[][], which were computed above from the motion vectors, with the result of the addition being limited to the interval [0,255]. The location of the pels is determined from mb_row, mb_column and the pattern_code list.

3.3.4 Skipped macroblocks

Some macroblocks are not stored, i.e. neither motion vector information nor DCT information is available to the decoder. These macroblocks occur when the macroblock_address_increment is greater than 1. The macroblocks for which no data is stored are called "skipped macroblocks".

In I-pictures, all macroblocks are coded and there are no skipped macroblocks.

In P0- and P1-pictures, the skipped macroblock is defined to be a macroblock with a reconstructed motion vector equal to zero and no DCT coefficients.

In P2- and B-pictures, the skipped macroblock is defined to have the same macroblock_type (forward, backward, or both motion vectors) as the prior macroblock, differential motion vectors (motion_horizontal/vertical_forward/backward) equal to zero, the same interpolation mode and differential motion vector(s), and no DCT coefficients. In P2- and B-pictures, a skipped macroblock shall not follow an intra-coded macroblock.

4. Status of the proposed algorithm

4.1 Compatibility

This algorithm cannot afford to give backward compatibility to MPEG1 and H.261. As for forward compatibility, it can give compatible codec in the form of a switchable encoder / decoder. Most part of the encoder / decoder for the two standards can be commonly used, and only the predictor, VLC tables, and coding controller are to be switched.

4.2 Random access

Random access is realized by accessing first to the nearest entry point (= I-picture) before the field to be accessed from all of the periodically inserted entry points. In this proposal, 1 GOP is constructed from 24 fields. 4 fields of I or P-pictures are necessary to decode B-picture in some cases. So, the longest path for random accessing is the access to the set of B2 and B3-picture located just before the entry point in input order and the accessing path is shown below.

(I) → (P0) → (B0) → (B1) → (B2) → (B3) → (P1) → (P2) → (B0) → (B1) → (B2) → (B3) → (P1) → (P2) → (B0) → (B1) → (B2) → (B3) → ◯(P1) → ◯(P2) → (B0) → (B1) → (B2) → (B3) → ◯(I) → ◯(P0) → (B0) → (B1) → B2* → B3*

(◯ denotes the field used for predicting the attended B2* and B3*,
and ( ) denotes a discarded field not used for prediction)

In this case, it is necessary to read out the amount of data corresponding to 1 GOP + I + P0 + B0 + B1 + B2 + B3. In this proposal, the amount of data is limited to be within 50 % of the target amount of data for 1 GOP. So, the maximum delay time becomes the time to read out the data corresponding to 1.5 GOP + 4 B, i.e about $24 / 60 \times 1.5 + \text{alpha} \approx 0.6$ sec.

Actually, there can be some fluctuation in the data amount for rate control for each GOP and the maximum delay becomes slightly more. The maximum value of the control fluctuation observed from actual simulations using 8 sequences was 0.62 sec.

4.3 Fast forward / fast reverse

Rate control is executed in this proposal so that the amount of generated information for a set of I-picture + P0-picture, which is used for fast forward and fast reverse playing, don't exceed 50 % of the target amount of data allocated to 1 GOP. This means that a set of I and P0-picture can be read out within 0.2 sec when working in a fast playing mode. For example, 6 times multiple speed playing mode is realized by decoding a set of I and P0-picture and skipping two sets every 0.2 sec shown below (each number denotes the continuous picture number).

normal play	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20...
6 times fast	0 1 0 1 0 1 0 1 0 1 0 1 72737273 72737273 72737273 72...

So, delay time for fast forward and fast reverse playing is 0.2 sec.

4.4 Coding / decoding delay

Coding / decoding delay is derived mainly from the delay caused by reordering the coding / decoding order owing to bi-directional prediction and the delay caused by the input / output buffer. The delay in format transformation at input / output, calculation at the filters or DCT is ignorablly small compared to these two.

First, the delay by reordering is investigated below. The input order of the fields at the encoder, the coded order of the fields at the encoder = the output order of the fields at the encoder = the input order of the fields at the decoder, the output order of the fields at the decoder is shown in Fig. 4-1. As shown in the figure, this delay corresponds to 6 fields at the decoder for the I and P-pictures and 6 fields at the encoder for the B-picture at the shortest even under the condition that the data of each field continues without any interval to make the delay short. (Note that this delay becomes 4 fields at the encoder and 2 fields at the decoder for I and P0-picture at the start of the sequence. Even in this case, the sum of the delay is the same.) Adding to this, still one field delay is necessary to read the activity of the I-picture before coding. The conclusion is that the coding / decoding delay for each picture corresponds to 7 fields, i.e. 7 / 60 = 0.117 sec.

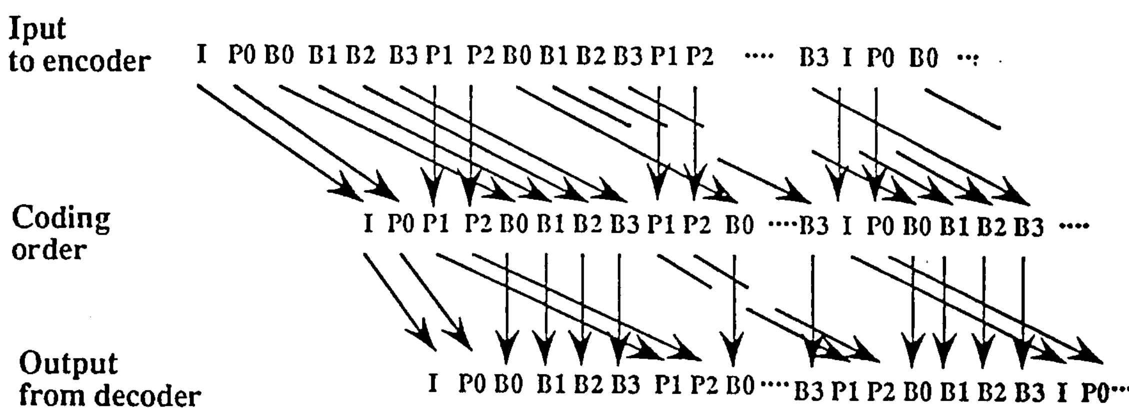


Fig. 4-1 Delay caused by reordering at encoder and decoder

Next, the delay caused by the buffer is investigated. Suppose the receiving data buffer of the decoder is modeled by a fixed rate input and instantaneous output of data when data are needed to be decoded, and the output data buffer is modeled by an instantaneous input when data are generated and at a fixed output rate. When rate control is executed so as not to make any overflow and underflow at the transmitting buffer, it is also warranted that the receiving buffer never overflows or underflows by preparing a buffer of the same capacity at the receiver. In this case, the total delay at the transmitting buffer and the receiving buffer is the capacity of the transmitting buffer (= the capacity of receiving buffer) divided by the output rate.

In this proposal, the amount of transmitting buffer and receiving buffer is determined to be 2^{21} (≈ 2M) bits at 9 Mbps. (As for 4 Mbps, $2^{11} \times 4/9$ Mbits are used for buffer). So, the delay by the buffer is ≈ 0.233 sec.

Considering the above two main factors, the coding / decoding delay by this proposal is estimated to be about 350 msec.

5. Implementation

5.1 List of picture buffer and data buffer

1) Encoder

Picture/data buffer	Number	Size(bits)
Picture buffer for Y	15	20736000 (720×240×8×15)
Picture buffer for C	9	12441600 (720×240×8×9)
Output data buffer	1	2097152 (2^{21})

2) Decoder

Picture/data buffer	Number	Size(bits)
Receiving data buffer	1	2097152 (2^{21})
Picture buffer for Y	4	5529600 (720×240×8×4)
Picture buffer for C	4	5529600 (720×240×8×4)

5.2 List for each module with functional description

5.2.1 Encoder

1) Input field memory

Memory	Size(words)	Width(bits)	On/Off chip
Input picture memory(Y 10 fields)	1728000	8	Off
Input picture memory(C 4 fields)	691200	8	Off
Picture delay memory(Y,C 1 field)	345600	8	Off
Block line memory(Y,C)	46080	8	On

Figure 5-1 shows a block diagram for the input field memory. For both Y and C signals, B0, B1, B2 and B3 pictures are stored in the input picture memories for changing the order of pictures. For the Y signal, I, Po, P1 and P2 pictures are also stored in the input picture memories. Stored pictures for the Y signal are used for the first stage motion vector search in the motion vector estimator 1. Y and C signals are multiplexed after scan format conversion by the block line memories. Then, they are delayed by one field for intra activity calculation.

2) Motion vector estimator 1

Memory	Size(words)	Width(bits)	On/Off chip
Motion vector memory	16200	7+6	On
Search data register in MVD1	8096	8	On
Distortion register in MVD1	1860	15	On
Register in acc. dist.calc. MVD1	1860	15	On

Addition	Width(bits)	Operations/sec
Subtraction in dist.calc. MVD1	8	16070400000
Addition in acc. dist.calc. MVD1	15	16070400000
Vector addition in MVD	7	540000

Figure 5-2 shows a block diagram for the motion vector estimator 1.

In this module, motion vectors for the first stage are calculated by the so called telescopic search, using the pictures before coding stored in the input field memory.

For each step in the telescopic search, four motion vector detectors (MVD1a..d) calculate intermediate motion vectors between two pictures, whose separation distance is one field or two, as follows. At first, search data are stored in the search data registers in the MVD1, by reading data in the input field memory addressed by the start motion vector, which has been stored in the motion vector (MV) memory at the previous search stage. Then, 31×15 distortion calculators derive the distortion values for all offset vector candidates in parallel. Finally, the motion vector is updated by adding the start motion vector and offset vector determined in the distortion comparator, and stored in the MV memory.

The picture to be referenced as an origin and the picture to be searched for in motion vector detection, in each step for each MVD, are illustrated in Table 5-1. The same pictures must be stored in two different field memories, occasionally, because data in the same picture with a different address must be read by different MVDs.

3) Motion vector estimator 2 with adaptive predictor

Memory	Size(words)	Width(bits)	On/Off chip
Search data register in MVD21	3840	8	On
Distortion register in MVD21	36	15	On
Register in acc. dist.calc.1 MVD21	36	15	On
Search data register in MVD22	11928	8	On
Distortion register in MVD22	72	15	On
Register in acc. dist.calc.2 MVD22	72	15	On
Temporary data register	6664	8	On
Macroblock delay	1024	8	On

Addition	Width(bits)	Operations/sec
Subtraction in dist.calc.1 MVD21	8	373248000

Addition in acc. dist.calc.1 MVD21	15	373248000
Vector addition in MVD21	7	648000
Addition in field interpolation filter	8	440316000
Subtraction in dist.calc.2 MVD22	8	746496000
Addition in acc. dist.calc.2 MVD22	15	746496000
Subtraction for r2 in MVD22	8	41472000
Addition for frame interpolation mode signal	8	41472000
Addition for bi-directional prediction signal	8	20736000
Subtraction in dist.calc.3	8	20736000
Addition in acc. dist.calc.3	15	20736000

Figure 5-5 shows a block diagram for motion vector estimator 2 with the adaptive predictor.

In this module, an adaptive inter field / inter frame prediction signal is generated from the decoded pictures, by the second stage motion vector estimation, as follows.

At first, for each decoded picture, motion vector detector 21(MVD21) refines the first stage motion vector, by searching for the decoded picture around a point within the ±1 range.

Second, the motion vector detector 22(MVD22) searches within the range of a half-pixel for both the field and frame interpolation mode, as described in Section 2. Search for the field interpolation mode is implemented, using the field interpolated picture, generated by the field interpolation filter. For the frame interpolation mode, search is accomplished using both the field interpolated picture, and the picture of the other field, pointed out by the refined motion vector detected by the MVD21.

Third, distortion comparator 1 selects the optimum interpolation, and the optimum prediction signal for forward or backward direction is generated.

Finally, forward, backward and interpolative prediction signals are compared, and the optimum one is selected.

5) Subtracter for prediction error signal

Addition	Width(bits)	Operations/sec
Subtraction for prediction error signal	8	20736000

6) Activity calculator

Memory	Size(words)	Width(bits)	On/Off chip
Block delay	64	8	On
Slice activity register	150	22	On

Addition	Width(bits)	Operations/sec
Addition in block DC calculator	14	864000
DC Subtraction	8	864000
Addition in slice activity calculator	22	20736000
Addition in picture activity calculator	27	1800

Figure 5-10 shows a block diagram for the activity calculator. For I pictures, absolute differences between pel values and the average value of the block, calculated by the block DC calculator, are derived as a measure of the activity. For P or B pictures, the absolute values for the AC coefficients of the result of DCT are used. Their sum for every slice and for one picture are calculated by the slice and picture activity accumulators.

7) DCT

Memory	Size(words)	Width(bits)	On/Off chip
Register in 8-point processor	80	16	On
Matrix transposition RAM	64	16	On
Scan conversion RAM	128	16	On

Addition	Width(bits)	Operations/sec
Addition in 8-point processor	16	165888000

Multiplication	Width(bits)	Operations/sec
Multiplication in 8-point processor	16	82944000

Table	Size(words)	Width(bits)	Fix/Dwn	Look up/sec
Scan table	256	6	Dwn	20736000
Coef table	4	16+16	Fix	20736000

Figure 5-11 shows the DCT block diagram. In this DCT module, a fast calculating algorithm described in Reference 3, whose calculation signal flow is depicted in Fig. 5-13, is used.

It consists of two 8-point processors for one-dimensional transform with a coefficient table, two 8 word buffers, matrix transposition RAMs and scan conversion RAMs with a scan table.

Each 8-point processor consists of three 8 word buffers, three adding stages and two multiplying stages. Addition or multiplication is carried out at pixel rate according to the signal flow graph shown in Fig. 5-13.

8) Quantizer

Multiplication	Width(bits)	Operations/sec
Multiplication in quantizer	12	20736000

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
$Quantize^{-1}$ table	4096	12	Dwn	20736000

Figure 5-14 shows the quantizer block diagram. The inverse values for quantization steps are stored in the quantize^{-1} table. Quantization is implemented by multiplying the selected value in this table, to the absolute value for the DCT coefficient.

9) Dequantizer

Addition	Width(bits)	Operations/sec
Offset addition	12	20736000

Multiplication	Width(bits)	Operations/sec
Q_scale multiplication	5×8	20736000
DCT coeff multiplication	8×12	20736000

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
Quantize table	128	8	Dwn	20736000

Figure 5-15 shows the dequantizer block diagram. The selected value in the quantize table and the quantizer scale are multiplied. The quantization step size is derived by adding the offset value and the multiplied value. Dequantization is carried out by multiplying the quantization step size by the quantized DCT coefficient.

10) IDCT

Memory	Size(words)	Width(bits)	On/Off chip
Register in 8-point processor	80	16	On
Matrix transposition RAM	64	16	On
Scan conversion RAM	128	16	On

Addition	Width(bits)	Operations/sec
Addition in 8-point processor	16	165888000

Multiplication	Width(bits)	Operations/sec
Multiplication in 8-point processor	16	82944000

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
Scan table	256	6	Dwn	20736000
Coef table	4	16+16	Fix	20736000

Figure 5-16 shows the IDCT block diagram. The operation for each stage in 8-point processors is depicted in Fig. 5-18.

11) Adder for local decoded signal

Addition	Width(bits)	Operations/sec
Addition for local decoded signal	8	20736000

12) Local decoded field memory

Memory	Size(words)	Width(bits)	On/Off chip
Decoded picture memory(Y,C 4 field)	1382400	8	Off

13) Encoder output stage (VLC, MUX and output data buffer)

Memory	Size(words)	Width(bits)	On/Off chip
Output data buffer	65536	32	Off

Addition	Width(bits)	Operations/sec
Subtraction in macroblock addr. DPCM encoder	6	81000(max)
Subtraction in motion vector DPCM encoder	8	648000(max)
Subtraction in block DC DPCM encoder	9	324000(max)

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
VLC table for M.B._address	64	12	Dwn	81000(max)
VLC table for M.B._type	64	7	Dwn	81000(max)
VLC table for C._B._P	16	9	Dwn	81000(max)
VLC table for motion vector	16	11	Dwn	648000(max)
VLC table for dct_dc_size	32	9	Dwn	324000(max)
VLC table for dct_coef	8192	17	Dwn	20736000(max)

Figure 5-19 shows a block diagram for the encoder output stage. Data in the sequence/GOP/picture/slice layer are generated by the header generator. Data in the macroblock layer are generated by the macroblock data generator, which contains the macroblock address DPCM encoder, motion vector DPCM encoder and VLC Table 1, using the motion vector data from motion vector estimator 2. Data in the block layer are generated by the block data generator, which contains the block DC DPCM encoder, the zero run counter and VLC Table 2, using the quantized DCT coefficient value from the quantizer. Data in each layer are multiplexed under the sequencer control, and are stored in the output data buffer. The rate controller determines the Q_scale value, using the activity data and the status for the output data buffer.

5.2.2 Decoder

1) Decoder input stage (receiving data buffer, VLD and DMUX)

Memory	Size(words)	Width(bits)	On/Off chip
Receiving data buffer	65536	32	Off
Macroblock mode memory	90	4	On
Motion vector memory	360	8+7	On
Q_scale memory	90	5	On
DCT coef. memory	512	9	On

Addition	Width(bits)	Operations/sec
Addition in macroblock addr. DPCM decoder	6	81000(max)
Addition in motion vector DPCM decoder	8	648000(max)
Addition in block DC DPCM decoder	9	324000(max)
Addition in run to position translator	6	20736000(max)

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
VLC decode table	8192	20	Dwn	27×10^6

Figure 5-20 shows a block diagram of the decoder input stage. Data from the receiving buffer are variable length decoded, and are demupltiplexed into macroblock data, block data and other data in sequence/GOP/picture layer. The macroblock data are decoded by the macro block data decoder, which contains the macroblock address decoder and the motion vector decoder. The block data are decoded by the block data decoder, which contains the block DC DPCM decoder and the translator from run to position. These decoded values are stored into the slice data memory.

A detailed block diagram of the VLD and DMUX is shown in Fig.5-21. The sequencer determines the kind of VLC/FLC to be decoded, by the start code detector output and the contents/inputs of the register array. This VLD can decode one variable length code per one clock. One variable length code is divided into three parts, namely, the front zero/one runs and the front_next_code and the rear_code. The length of zero/one run is detected by the zero/one run detector. This value and the front_next_code are fed into the VLC decode table. The decoded value for the front_code and the number of bits for the rear_code are generated by the table. The rear_code is decoded by the rear code detector. The clock rate is the same as that for the pel rate (27MHz). The timing periods for decoding the data in the slice/macroblock layer and the sequence/GOP/picture layer can be maintained by the horizontal and vertical blanking periods.

2) Adaptive predictor

Addition	Width(bits)	Operations/sec

Addition in field interpolation filter	8	181440000
Addition for frame interpolation mode signal	8	41472000
Addition for bi-directional prediction signal	8	20736000

Figure 5-22 shows a block diagram of the adaptive predictor for the decoder. The function for this module is the same as that for the adaptive predictor in the encoder.

3) Dequantizer

Addition	Width(bits)	Operations/sec
Offset addition	12	20736000

Multiplication	Width(bits)	Operations/sec
Q_scale multiplication	5×8	20736000
DCT coeff multiplication	8×12	20736000

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
Quantize table	128	8	Dwn	20736000

This module is the same as that for the encoder.

4) IDCT

Memory	Size(words)	Width(bits)	On/Off chip
Register in 8-point processor	80	16	On
Matrix transposition RAM	64	16	On
Scan conversion RAM	128	16	On

Addition	Width(bits)	Operations/sec
Addition in 8-point processor	16	165888000

Multiplication	Width(bits)	Operations/sec
Multiplication in 8-point processor	16	82944000

Table	Size(words)	Width(bits)	Fix/Dwn	Lookup/sec
Scan table	256	6	Dwn	20736000
Coef table	4	16+16	Fix	20736000

This module is the same as that for the encoder.

5) Adder for decoded signal

Addition	Width(bits)	Operations/sec
Addition for decoded signal	8	20736000

6) Decoded field memory with output

Memory	Size(words)	Width(bits)	On/Off chip
Decoded picture memory(Y,C 4 field)	1382400	8	Off
Block line memory(Y,C)	23040	8	On

Figure 5-23 shows a block diagram for the decoded field memory with output. Decoded B pictures are directly fed into the block line memory, which is used for scan conversion to output signals. I and P pictures are stored in the decoded picture memory, and they are used as inputs for both the adaptive predictor and the block line memory.

5.3 Supplemental document in implementation

This is the supplemental document explaining how the numbers in the lists in Section 5.2 are calculated.

5.3.1 Encoder

1) Input field memory

Input picture memory(Y 10 fields) 1728000 = #pel_field × 10
Input picture memory(Y 4 fields) 691200 = #pel_field × 4
Picture delay memory(Y,C 1 fields) 345600 = #pel_field × 2
Block line memory 46080 = #h_field × #v_macro × 4 × 2
4: Number of block lines
2: Number of block line memories

2) Motion vector estimator 1

Motion vector memory 16200 = #macro_field × 12
12: Number of motion vector memories
Search data register in MVD1
8096 = (#h_macro + 2 × #h_search) ×
(#v_macro + 2 × #v_search) × 2 × #MVD1
2: Double buffer
#MVD1 = 4 :Number of MVD1s
Distortion register in MVD1

Register in acc. dist.calc. MVD1

$1860 = \#search \times \#MVD1$

Subtraction in dist.calc. MVD1

Addition in acc. dist.calc MVD1

$16070400000 = \#search \times \#pel\_field \times \#field\_sec \times \#MVD1 \times \#MD1\_act$

$\#MVD1\_act = (\#MVD1 \times \#field\_gop - (2+2+4+8)) / \#MVD1 / \#field\_gop$

: Average operating ratio for MVD1s

(MVD1s do not operate all the time.)

Vector addition in MVD

$540000 = \#macro\_field \times \#field\_sec \times \#MVD1 \times \#MVD1\_act \times 2$

2: Horizontal and vertical vector

3) Motion vector estimator 2 with adaptive predictor

Search data register in MVD21

$$3840 = ((\#h\_macro + 4) \times (\#v\_macro + 4) + (\#h\_macro / 2 + 2) \times (\#v\_macro + 4) \times 2) \times 2 \times \#MVD21$$

2: Double buffer

$\#MVD21 = 4$: Number of MD21

Distortion register in MVD21

Register in acc. dist.calc. MVD21

$36 = \#search\_21 \times \#MVD21$

$\#search\_21 = 9$: Number of searching points in one MVD21

Search data register in MD22

$$11928 = (((\#h\_macro + 3) \times 2 - 1) \times ((\#v\_macro + 3) \times 2 - 1) + \quad :Y$$
$$((\#h\_macro / 2 + 1) \times 2 - 1) \times ((\#v\_macro + 3) \times 2 - 1) \times 2 \quad :C\times 2$$
$$) \times 2 \times \#MVD22$$

2: Double buffer

$\#MVD22 = 4$:Number of MVD22

Distortion register in MVD22

Register in acc. dist.calc. MVD22

$72 = \#search\_22 \times \#MVD22$

$\#search\_22 = 18$: Number of searching points in one MVD22

Temporary data register

$$6664 = ((\#h\_macro \times 2 + 1) \times (\#v\_macro \times 2 + 1) + \quad :Y$$
$$(\#h\_macro / 2) \times (\#v\_macro \times 2 + 1) \times 2 \quad :C\times 2$$
$$) \times 2 \times \#T.d.r$$

2: Double buffer

#T.d.r: Number of temporary data registers

Macroblock delay

$1024 = \#pel\_macro \times 8$

8: two macroblock(Y) and three macroblock(Y,C)

Subtraction in dist.calc. MVD21

Addition in acc. dist.calc MVD21

$373248000 = \#search\_21 \times \#pel\_field \times \#field\_sec \times \#MVD21$

Vector addition in MVD21

648000 = #macro_field × #field_sec × #MVD21 × 2

2: Horizontal and vertical vector

Addition in field interpolation filter

440316000 = #a.f.i.f_macro × #macro_field × field_sec × #f.i.f

#a.f.i.f_macro = (	(#v_macro + 3) × (#h_macro + 4) +	Ver. Y
	(#h_macro + 3) × ((#v_macro + 4) × 2 - 1) +	Hor. Y
	((#v_macro + 3) × (#h_macro / 2 + 3) +	Ver. C
	(#h_macro / 2 + 2) × ((#v_macro + 4) × 2 -1)	Hor. C
	) × 2) = 1359	

: Addition in one field interpolation filter per macroblock

#f.i.f = 4: Number of field interpolation filter

Subtraction in dist.calc. MVD22

Addition in acc. dist.calc MVD22

746496000 = #search_22 × #pel_field × #field_sec × #MVD22

Subtraction for r2 in MVD22

41472000 = #pel_field × #field_sec × #MVD22

Addition for frame interpolation mode signal

41472000 = #pel_field × 2 × #field_sec × 2

2: Y and C

2: Forward and backward

Addition for bi-directional prediction signal

20736000 = #pel_field × 2 × #field_sec × 2

2: Y and C

Subtraction in dist.calc.3

Addition in acc. dist.calc 3

20736000 = #pel_field × 2 × #field_sec × 2

2: Two candidates

5) Subtracter for prediction error signal

20736000 = #pel_field × 2 × #field_sec

2: Y and C

6) Activity calculator

Slice activity register

150 = #v_field / #v_macro × 5

5: I, P0, P1, P2 and B

Addition in block DC calculator

864000 = #pel_field × 2 × #field_sec × 1/24

1/24: Number of I pictures in GOP

Addition in slice activity calculator

Addition in picture activity calculator

1800 = #slice_field × #field_sec

7) DCT

Addition in 8-point processor

165888000 = #pel_field × 2 × #field_sec × (3 + 2 × 1/2) × 2

3: Number of add. stages in one 8-point processor

2: Number of mult. stages in one 8-point processor

2: Number of 8-point processors

Multiplication in 8-point processor

82944000 = #pel_field × 2 × #field_sec × 4

4: Number of mult. stages in two 8-point processors

Scan table, Coef table

20736000 = #pel_field × 2 × #field_sec

8) Quantizer

Multiplication in quantizer, Quantize^{-1} table

20736000 = #pel_field × 2 × #field_sec

9) Dequantizer

Offset addition, Q_scale multiplication, DCT coeff multiplication

20736000 = #pel_field × 2 × #field_sec

10) IDCT

same as DCT

11) Adder for local decoded signal

20736000 = #pel_field × 2 × #field_sec

2: Y and C

12) Local decoded field memory

Decoded picture memory(Y,C 4 fields) 1382400 = #pel_field × 2 × 4

13) VLC, MUX and output data buffer

Subtraction in macroblock addr. DPCM enc. 81000 = #macro_field × #field_sec

Subtraction in MV DPCM encoder 648000 = #macro_field × 2 × 4 × #field_sec

2: Horizontal and vertical

4: Four reference fields

Subtraction in block DC DPCM encoder 324000 = #macro_field × 4 × #field_sec

4: Four blocks in one macroblock

VLC table for M.B._address

VLC table for M.B._type

VLC table for C._B._P.	81000 = #macro_field × #field_sec
VLC table for motion vector	648000 = #macro_field × 2 × 4 × #field_sec 2: Horizontal and vertical 4: Four reference fields
VLC table for dct_dc_size	324000 = #macro_field × 4 × #field_sec 4: Four blocks in one macroblock
VLC table for dct_coef	20736000 = #pel_field × 2 × #field_sec 2: Y and C

5.3.2 Decoder

1) Receiving data Buffer, VLD and DMUX

Macroblock mode memory	90 = #macro_slice × 2 2: Double buffer
Motion vector memory	360 = #macro_slice × 4 × 2 4: Four reference fields 2: Double buffer
Q_scale memory	90 = #macro_slice × 2 2: Double buffer
DCT coef. memory	512 = #pel_macro × 2 × 2 2: Y and C 2: Double buffer

Addition in macroblock addr. DPCM dec. 81000 = #macro_field × #field_sec

Addition in motion vector DPCM dec. 648000 = #macro_field × 2 × 4 × #field_sec
2: Horizontal and vertical
4: Four reference field

Addition in block DC DPCM decoder 324000 = #macro_field × 4 × #field_sec
4: Four blocks in one macroblock

Addition in run to position translator 20736000 = #pel_field × 2 × #field_sec

VLC decode table 8192 = $2^{(4+4+5)}$
4: Number of bits for VLC code selection
4: Number of bits for 0/1 run number
5: Number of bits for front next_code
20 = 3 + 4 + 1 + 12
3: Number of bits for front_next_code length
4: Number of bits for rear_code length
1: Escape flag
12: Number of bits for Decode value

3) Adaptive predictor

Addition in field interpolation filter
181440000 = #a.f.i.f(d)_macro × #macro_field × field_sec × #f.i.f
#a.f.i.f_macro = (#h_macro + 2) × #v_macro + Ver. Y
#h_macro × #v_macro + Hor. Y

((#h_macro / 2 + 2) × #v_macro +   Ver. C

#h_macro / 2 × #v_macro)   Hor. C

) × 2 = 560

: Addition in one field interpolation filter per one macro block

#f.i.f = 4: Number of field interpolation filters

Addition for frame interpolation mode signal

41472000 = #pel_field × 2 × #field_sec × 2

2: Y and C

2: Forward and backward

Addition for bi-directional prediction signal

20736000 = #pel_field × 2 × #field_sec

2: Y and C

4) Dequantizer

Same as that for the encoder

5) IDCT

Same as that for the encoder

6) Adder for decoded signal

Same as the adder for the local decoded signal in the encoder

7) Decoded field memory with output

Decoded picture memory(Y,C 4 field) 1382400 = #pel_field × 2 × 4

Block line memory 23040 = #h_field × #v_macro × 2 × 2

2: Y and C

2: Double buffer

#pel_field = #h_size × #v_size	:Number of pels per field (Y or C)
#h_field = 720	:Horizontal size of a field memory (Y)
#v_field = 240	:Vertical size of a field memory (Y or C)
#h_macro = 16	:Horizontal size of a macro block (Y)
#v_macro = 8	:Vertical size of a macro block (Y or C)
#pel_macro = #h_macro × #v_macro	:Number of pels per macro block (Y)
#macro_field = #pel_field / #pel_macro	:Number of macro blocks per field
#macro_slice = #h_field / #h_macro	:Number of macro blocks per slice
#slice_field = #v_field / #v_macro	:Number of slices per field
#h_search = 15	:Horizontal search region (+/-) in the MVD1
#V_search = 7	:Vertical search region (+/-) in the MVD1
#search = (1 + 2 × #h_search) × (1 + 2 × #v_search)	:Number of search points in the MVD1
#field_sec = 60	:Number of fields per sec
#field_gop = 24	:Number of fields per GOP

Input order		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Input picture		B0a	B1a	B2a	B3a	Ia	P0a	B0b	B1b	B2b	B3b	P1b	P2b	B0c	B1c	B2c	B3c	P0c
MVD 1a	Referenced	P0d	P0d	P0d	P0d			Ia	Ia	Ia	Ia	Ia	Ia	P1b	P1b	P1b	P1b	P1b
	Searched	B0a	B1a	B2a	B3a			B0b	B1b	B2b	B3b	P1b	P2b	B0c	B1c	B2c	B3c	P0c
MVD 1b	Referenced	P1d	P1d	P1d	P1d			P0a	P0a	P0a	P0a	P0a	P0a	P2b	P2b	P2b	P2b	P2b
	Searched	B0a	B1a	B2a	B3a			B0b	B1b	B2b	B3b	P1b	P2b	B0c	B1c	B2c	B3c	P0c
MVD 1c	Referenced	P0d	P0d	P0d		Ia	Ia	Ia	Ia	Ia		P1b	P1b	P1b	P1b	P1b		P0c
	Searched	B2d	B0d	B1d		B3a	P0a	B2a	B0a	B1a		B3b	P2b	B2b	B0b	B1b		B3c
MVD 1d	Referenced	P1d	P1d	P1d			P0a	P0a	P0a	P0a			P2b	P2b	P2b	P2b		
	Searched	B1d	B0d	B2d			B3a	B1a	B0a	B2a			B3b	B1b	B0b	B2b		
Coding picture		P1d	B0d	B1d	B2d	B3d	Ia	P0a	B0a	B1a	B2a	B3a	P1b	P2b	B0b	B1b	B2b	B3b

Input order		18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Input picture		P1c	B0d	B1d	B2d	B3d	P0d	P1d	B0a	B1a	B2a	B3a	Ia	P0a	B0b	B1b	B2b	B3b
MVD 1a	Referenced	P1b	P0c	P0c	P0c	P0c	P0c	P0c	P0d	P0d	P0d	P0d			Ia	Ia	Ia	Ia
	Searched	P1c	B0d	B1d	B2d	B3d	P0d	P1d	B0a	B1a	B2a	B3a			B0b	B1b	B2b	B3b
MVD 1b	Referenced	P2b	P1c	P1c	P1c	P1c	P1c	P1c	P1d	P1d	P1d	P1d			P0a	P0a	P0a	P0a
	Searched	P1c	B0d	B1d	B2d	B3d	P0d	P1d	B0a	B1a	B2a	B3a			B0b	B1b	B2b	B3b
MVD 1c	Referenced	P0c	P0c	P0c	P0c		P0d	P0d	P0d	P0d	P0d		Ia	Ia	Ia	Ia	Ia	
	Searched	P1c	B2c	B0c	B1c		B3d	P1d	B2d	B0d	B1d		B3a	P0a	B2a	B0a	B1a	
MVD 1d	Referenced	P1c	P1c	P1c	P1c			P1d	P1d	P1d	P1d			P0a	P0a	P0a	P0a	
	Searched	B3c	B1c	B0c	B2c			B3d	B1d	B0d	B2d			B3a	B1a	B0a	B2a	
Coding picture		P1c	B0c	B1c	B2c	B3c	P0d	P1d	B0d	B1d	B2d	B3d	Ia	P0a	B0a	B1a	B2a	

Table 5-1 Timing table of motion vector estimator 1

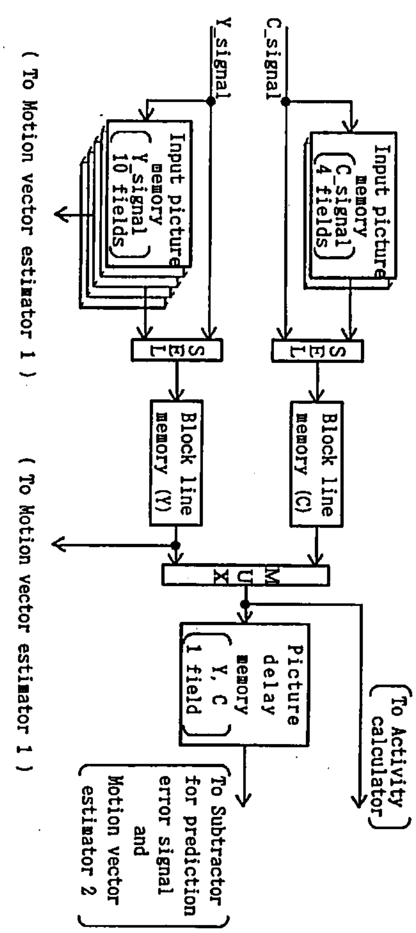


Figure 5-1 Input field memory

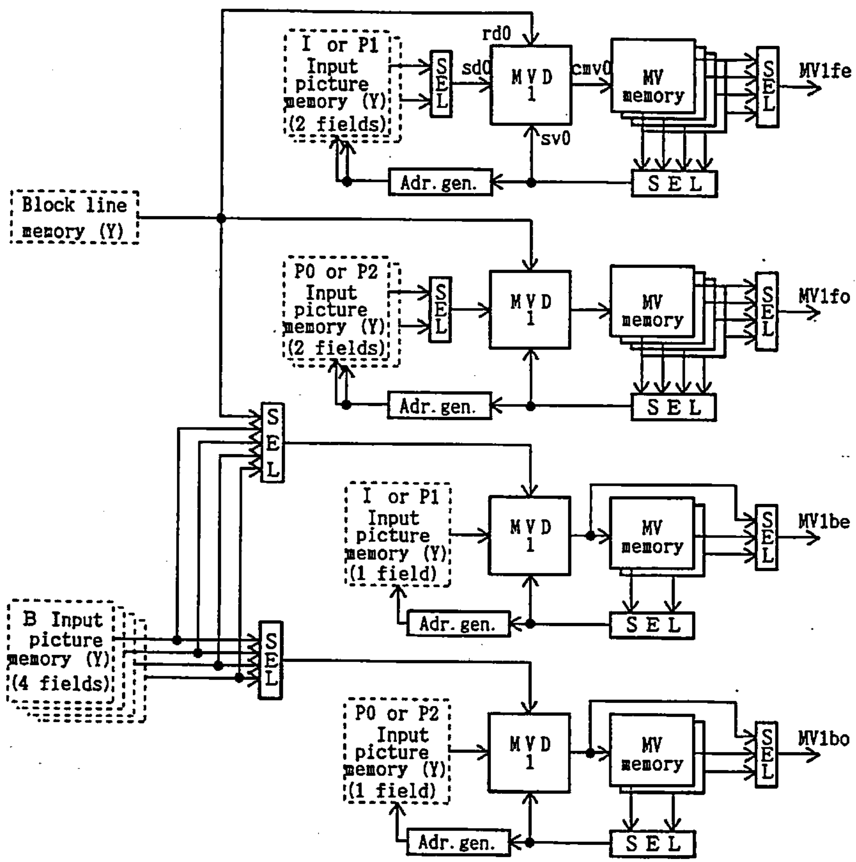


Figure 5-2 Motion vector estimator 1

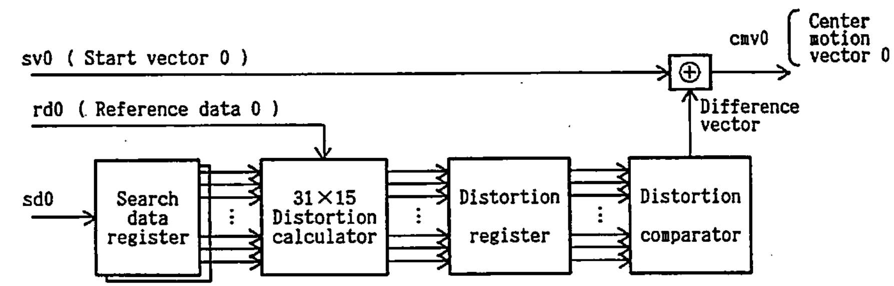


Figure 5-3 MVD1 (Motion vector detector 1)

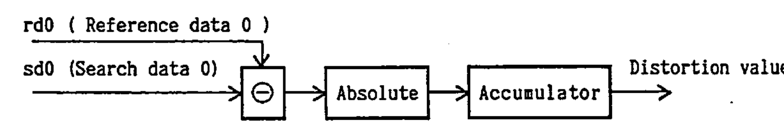


Figure 5-4 One of 31×15 Distortion calculators

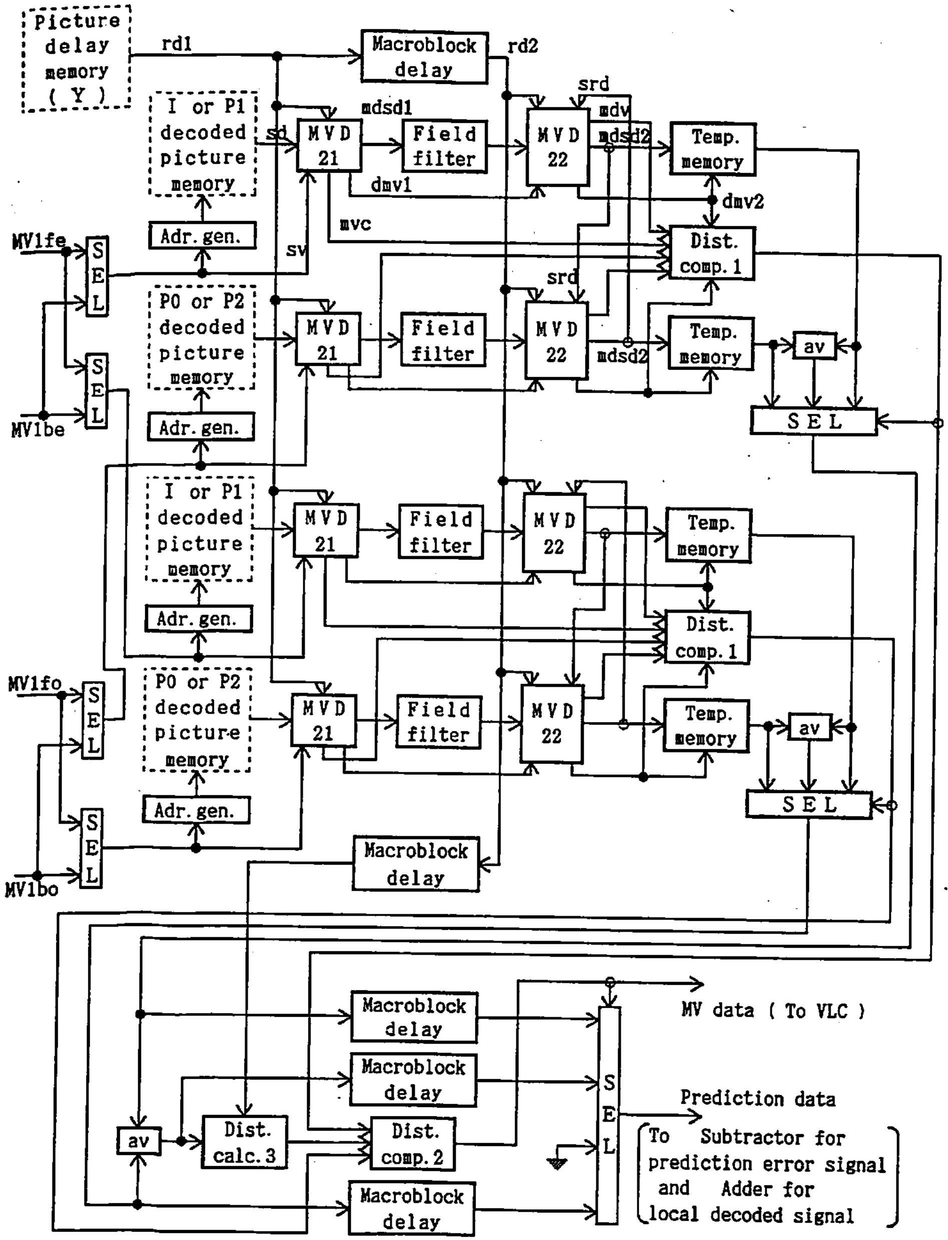


Figure 5-5 Motion vector estimator 2 with adaptive predictor

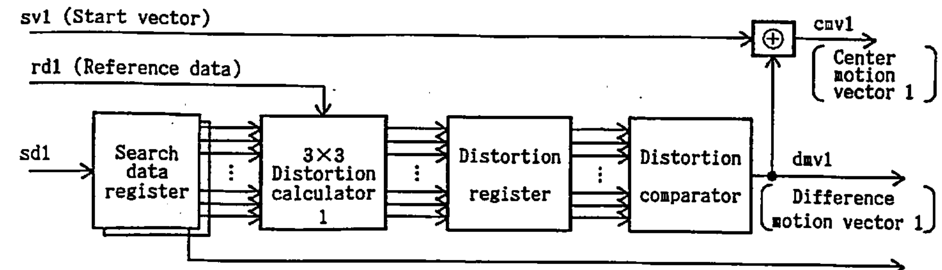


Figure 5-6 MVD21 (Motion vector detector 21)

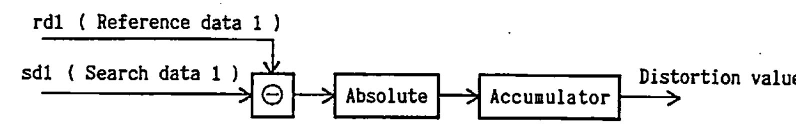


Figure 5-7 One of 3×3 Distortion calculators 1

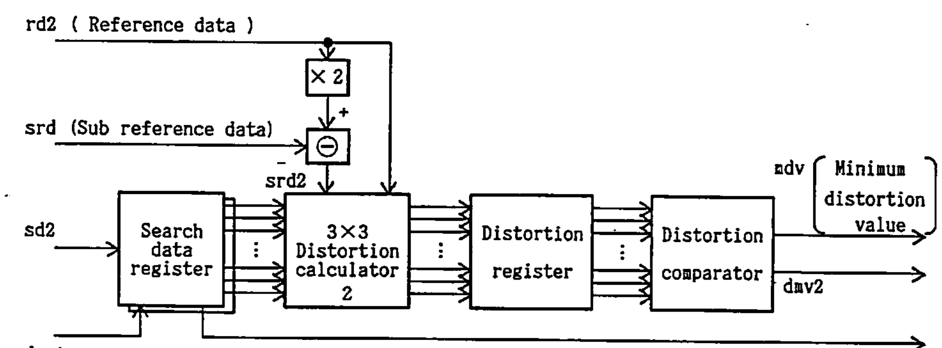


Figure 5-8 MVD22 (Motion vector detector 22)

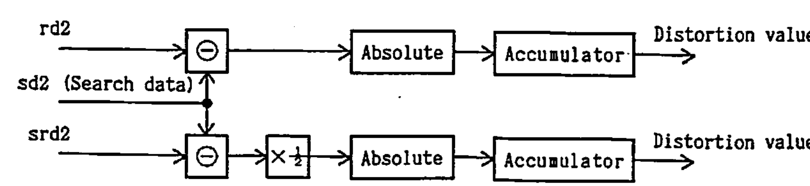


Figure 5-9 One of 3×3 Distortion calculators 2

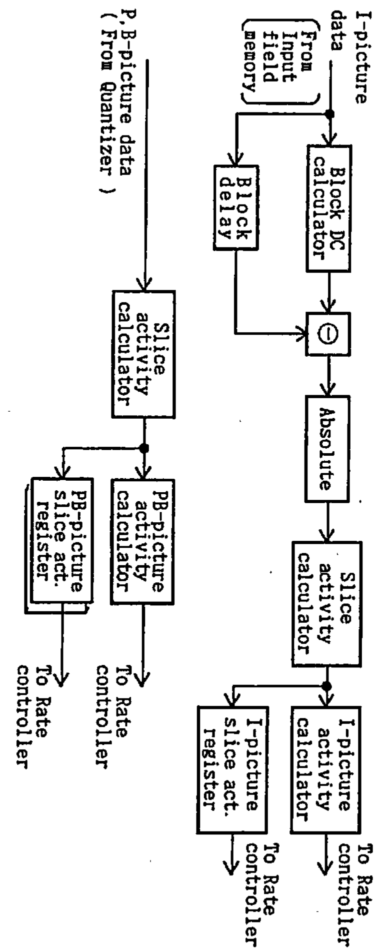


Figure 5-10 Activity calculator

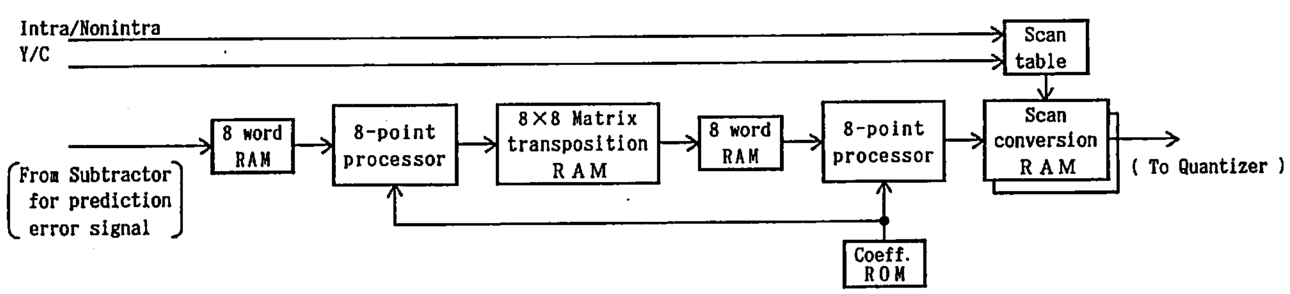


Figure 5-11 DCT

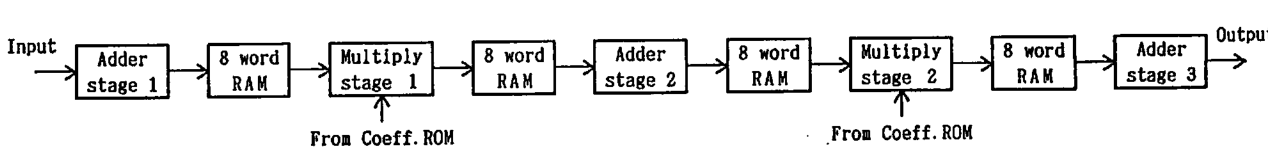


Figure 5-12 8-point processor

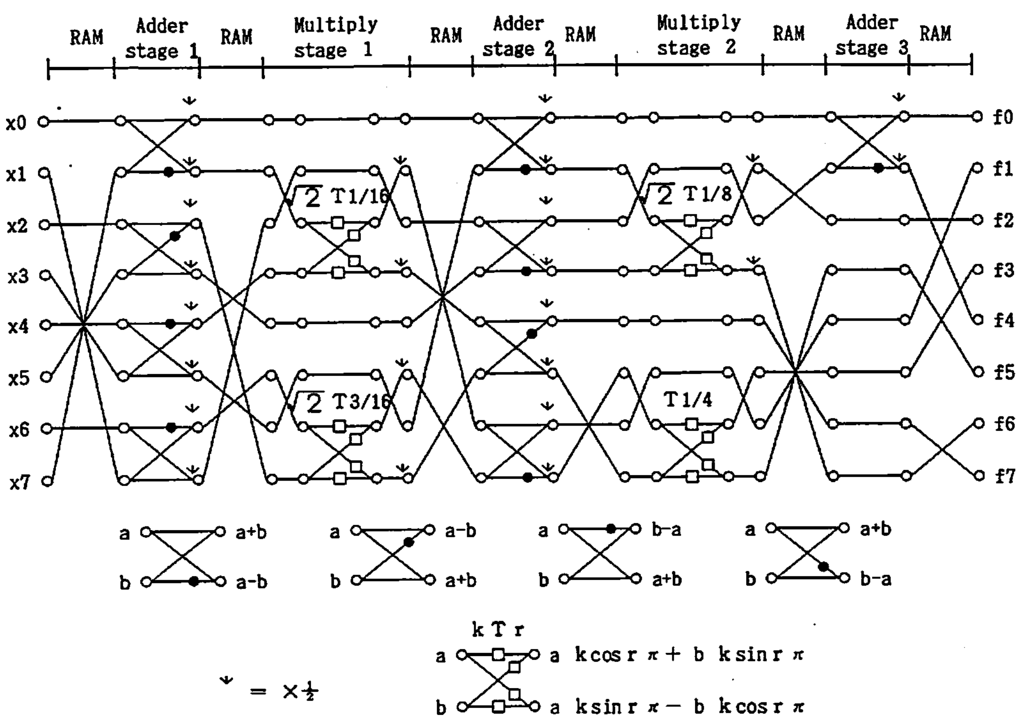


Figure 5-13 8-point DCT signal flowgraph

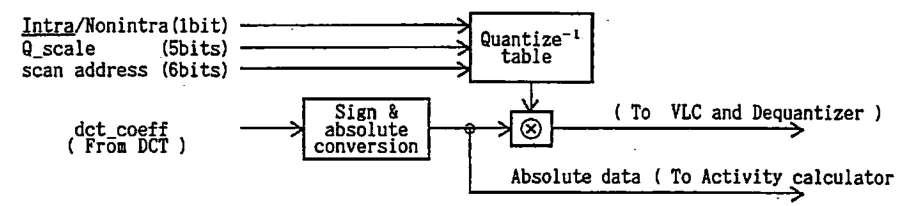


Figure 5-14 Quantizer

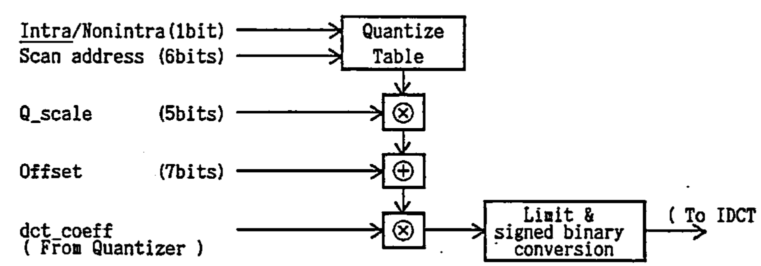


Figure 5-15 Dequantizer

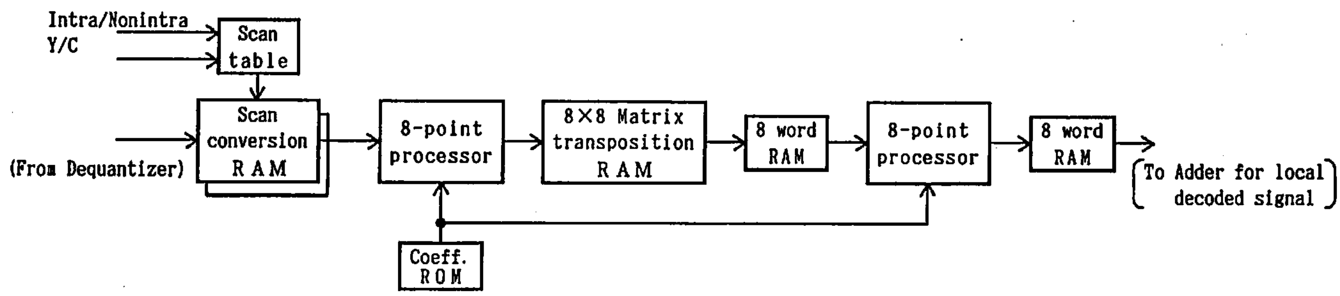


Figure 5-16 IDCT

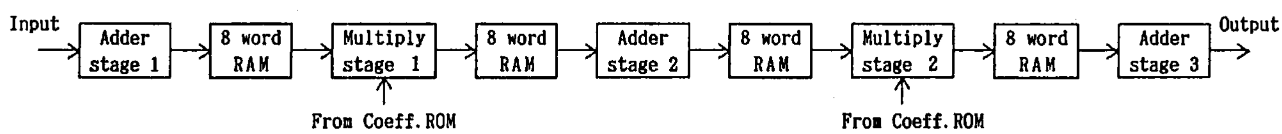


Figure 5-17 8-point processor

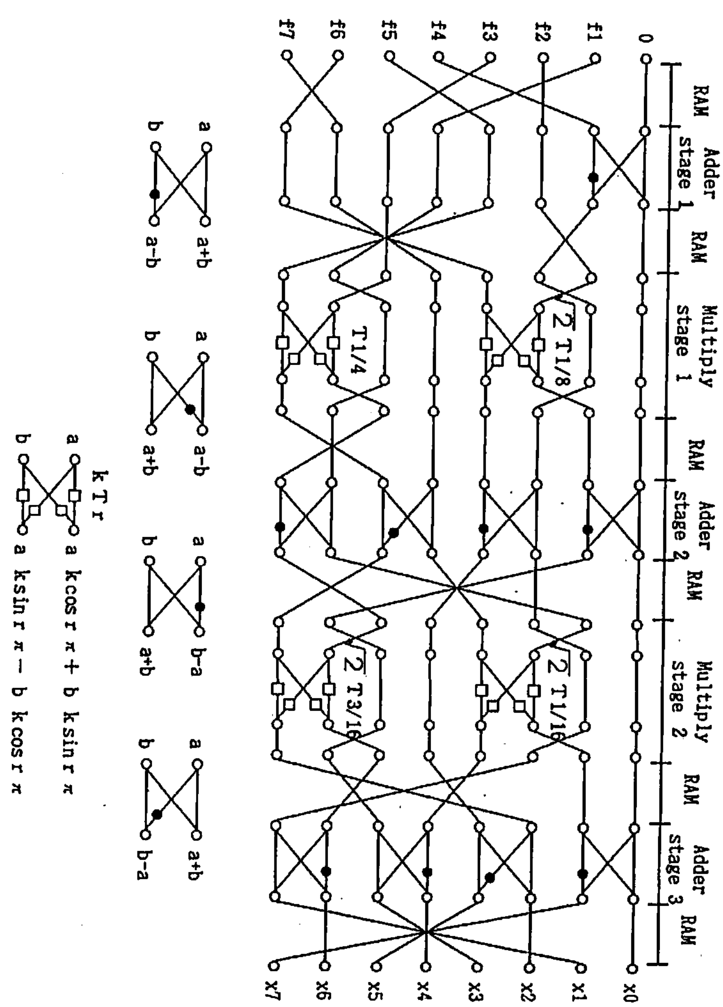


Figure 5-18 8-point IDCT signal flowgraph

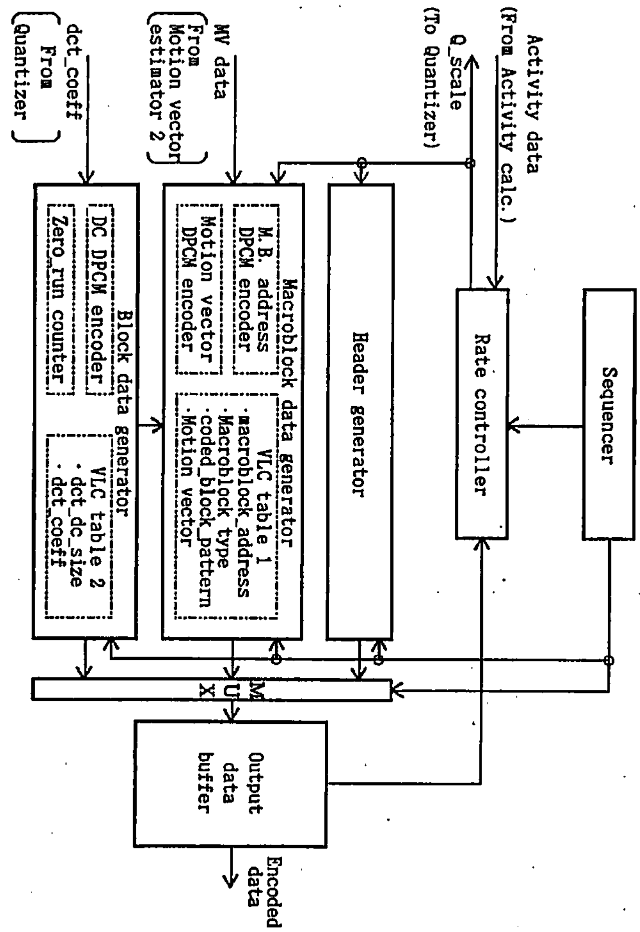


Figure 5-19 Encoder output stage (VLC and Rate controller)

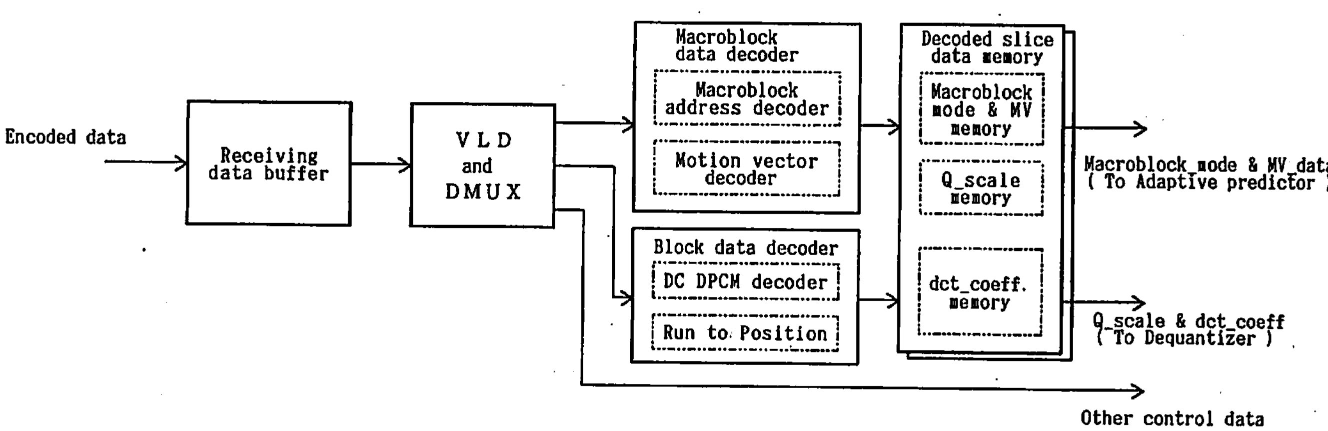


Figure 5-20 Decoder input stage

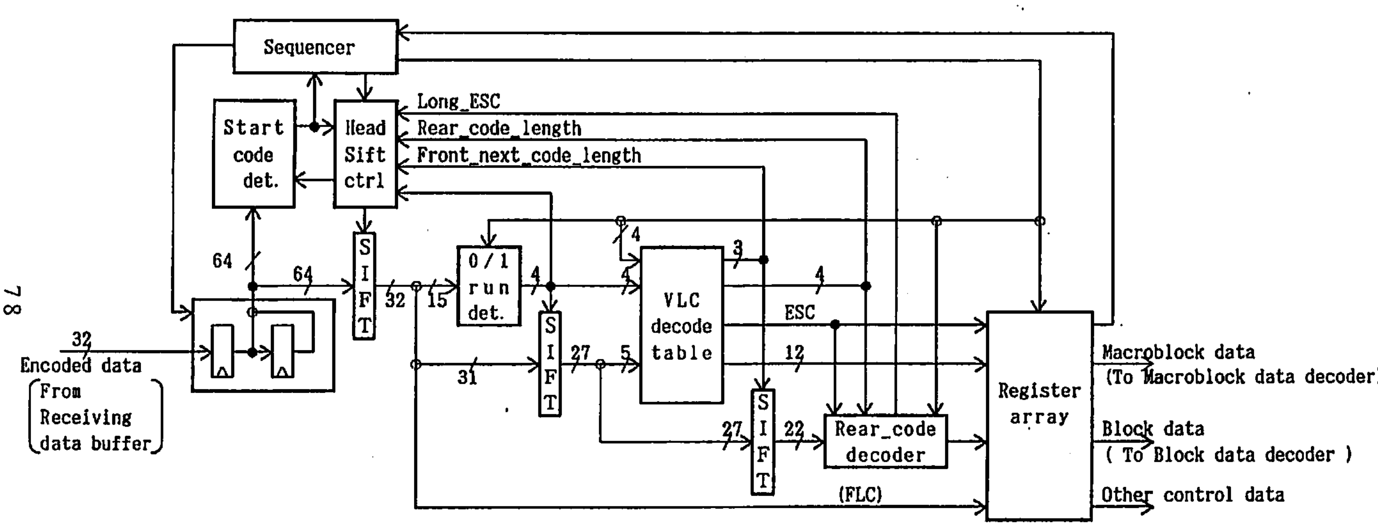


Figure 5-21 VLD and DMUX

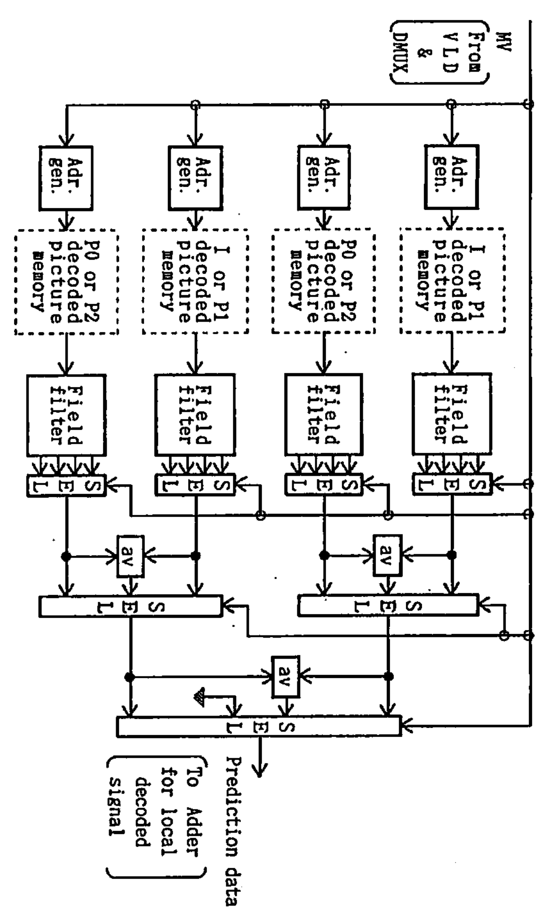


Figure 5-22 Adaptive predictor

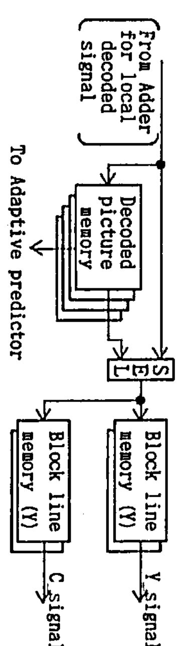


Figure 5-23 Decoded field memory with output memory

6. Simulation results

The simulation results of the proposed method for predetermined test sequences are shown in the following pages. Table 6-1 shows a coded bit stream list in UNIX "ls -l" command.

```
total 31808
-r--r-----  1 mpeg   2495064 Oct 16 10:29 flower-4M.stream
-r--r-----  1 mpeg   5620414 Oct 16 10:31 flower-9M.stream
-r--r-----  1 mpeg   2495388 Oct 16 10:32 football-4M.stream
-r--r-----  1 mpeg   2498335 Oct 16 10:43 mobile-4M.stream
-r--r-----  1 mpeg   5621989 Oct 16 10:45 mobile-9M.stream
-r--r-----  1 mpeg   5621641 Oct 16 10:34 popple-9M.stream
-r--r-----  1 mpeg   2496318 Oct 16 11:05 tennis-4M.stream
-r--r-----  1 mpeg   5620768 Oct 16 11:07 tennis-9M.stream
```

Table 6-1 Coded bit stream list


```
Flower Garden : 4.0000 Mbits/sec :  Results averaged over sequence

Total :  300 pictures
         SNR for luminance                30.74 dB
         SNR for chrominance (Cb)         33.85 dB
         SNR for chrominance (Cr)         33.99 dB
         Number of bits
              Coefficients       Y     11152646 bits
                                 Cb      866604 bits
                                 Cr     1302042 bits
                                 total 13321292 bits
              Motion vectors            4353445 bits
              Overhead                  2285775 bits
              TOTAL                    19960512 bits
         Mean value of Q scale             12.75

I-picture :  13 pictures
         SNR for luminance                32.27 dB
         SNR for chrominance (Cb)         34.75 dB
         SNR for chrominance (Cr)         34.43 dB
         Number of bits
              Coefficients       Y      3185767 bits
                                 Cb      530839 bits
                                 Cr      688003 bits
                                 total  4404609 bits
              Motion vectors                  0 bits
              Overhead                    52079 bits
              TOTAL                     4456688 bits
         Mean value of Q scale              9.12

B-picture :  198 pictures
         SNR for luminance                30.53 dB
         SNR for chrominance (Cb)         33.89 dB
         SNR for chrominance (Cr)         34.04 dB
         Number of bits
              Coefficients       Y      1601916 bits
                                 Cb       34706 bits
                                 Cr       68881 bits
                                 total  1705503 bits
              Motion vectors            3251118 bits
              Overhead                  1444547 bits
              TOTAL                     6401168 bits
         Mean value of Q scale             14.57

P0-picture :  13 pictures
         SNR for luminance                31.20 dB
         SNR for chrominance (Cb)         33.60 dB
         SNR for chrominance (Cr)         33.81 dB
         Number of bits
              Coefficients       Y      1316953 bits
                                 Cb       41456 bits
                                 Cr       72788 bits
                                 total  1431197 bits
              Motion vectors              79183 bits
              Overhead                   101436 bits
              TOTAL                     1611816 bits
         Mean value of Q scale              9.15

P1-picture :  38 pictures
         SNR for luminance                31.05 dB
         SNR for chrominance (Cb)         33.69 dB
         SNR for chrominance (Cr)         33.82 dB
         Number of bits
              Coefficients       Y      2715492 bits
                                 Cb      162853 bits
                                 Cr      280774 bits
                                 total  3159119 bits
              Motion vectors             457113 bits
              Overhead                   293112 bits
              TOTAL                     3909344 bits
         Mean value of Q scale              9.23

P2-picture :  38 pictures
         SNR for luminance                30.98 dB
         SNR for chrominance (Cb)         33.58 dB
         SNR for chrominance (Cr)         33.79 dB
         Number of bits
              Coefficients       Y      2332518 bits
                                 Cb       96750 bits
                                 Cr      191596 bits
                                 total  2620864 bits
              Motion vectors             566031 bits
              Overhead                   393641 bits
              TOTAL                     3580536 bits
         Mean value of Q scale              9.27
```

Flower Garden : 4.0000 Mbits/sec : Statistics of each field and frame

COD	INP	T	Qsc	field SN-Y	field SN-Cb	field SN-Cr	field bits	frame SN-Y	frame SN-Cb	frame SN-Cr	frame bits	cumulative bit count
0	0	I	7.4	34.08	36.27	36.18	327736					327896
1	1	P0	7.0	33.36	35.24	35.37	136688	33.70	35.73	35.75	464424	464584
2	6	P1	11.2	31.79	35.23	35.38	87256					551840
3	7	P2	8.5	32.41	34.81	35.09	79120	32.09	35.01	35.23	166376	630960
4	2	B	14.7	31.94	35.49	35.72	31856					662616
5	3	B	14.7	31.64	34.72	35.12	33880	31.79	35.09	35.41	65536	696496
6	4	B	15.0	31.45	35.16	35.47	35480					731976
7	5	B	14.7	31.53	34.73	35.18	30976	31.49	34.94	35.32	66456	762952
8	12	P1	9.5	31.84	34.50	34.84	103864					866816
9	13	P2	9.6	31.39	34.10	34.55	81384	31.61	34.30	34.69	185248	948200
10	8	B	14.7	31.64	34.90	35.28	31584					979784
11	9	B	14.7	31.41	34.43	34.87	33896	31.53	34.66	35.07	65480	1013680
12	10	B	14.7	30.92	34.58	35.06	37752					1051432
13	11	B	14.7	30.83	34.26	34.65	34736	30.87	34.42	34.85	72488	1086168
14	18	P1	9.1	31.86	34.34	34.62	116576					1202744
15	19	P2	9.0	31.70	34.11	34.43	95264	31.78	34.23	34.53	211840	1298008
16	14	B	14.0	31.30	34.27	34.63	33464					1331472
17	15	B	14.0	31.11	34.00	34.43	34520	31.20	34.13	34.53	67984	1365992
18	16	B	14.0	31.14	34.19	34.64	32648					1398640
19	17	B	12.7	31.27	34.11	34.56	34160	31.20	34.15	34.60	66808	1432800
20	24	I	9.2	32.57	35.25	35.02	313368					1746232
21	25	P0	9.0	31.66	34.27	34.46	109128	32.09	34.74	34.73	422496	1855360
22	20	B	13.7	31.47	34.55	34.79	33328					1888688
23	21	B	14.0	30.78	34.63	34.88	41376	31.11	34.59	34.84	74704	1930064
24	22	B	14.0	31.03	34.81	35.01	35344					35344
25	23	B	14.0	30.63	34.48	34.82	41896	30.83	34.64	34.91	77240	77240
26	30	P1	8.9	31.70	34.46	34.49	112112					189352
27	31	P2	8.2	31.97	34.42	34.63	91072	31.84	34.44	34.56	203184	280424
28	26	B	13.0	31.19	34.77	34.94	37936					318360
29	27	B	13.0	31.68	34.73	34.81	34378	31.43	34.75	34.87	72312	352738
30	28	B	12.7	31.35	34.54	34.65	34248					386984
31	29	B	12.7	31.29	34.40	34.63	35248	31.32	34.47	34.64	69496	422232
32	36	P1	7.9	32.07	34.33	34.58	117632					539864
33	37	P2	9.1	31.18	33.78	34.26	88528	31.60	34.05	34.42	206160	628392
34	32	B	13.0	31.03	34.12	34.47	36280					664672
35	33	B	13.0	31.04	34.25	34.65	41744	31.03	34.18	34.56	78024	706416
36	34	B	13.0	30.81	34.14	34.51	38448					744864
37	35	B	13.0	30.53	34.19	34.66	42688	30.67	34.17	34.58	81136	787552
38	42	P1	10.2	30.74	33.62	33.94	99312					886864
39	43	P2	8.9	31.33	33.88	34.01	95752	31.03	33.75	33.97	195064	982616
40	38	B	15.0	30.25	33.87	34.32	36336					1018952
41	39	B	15.0	30.55	33.82	34.19	33000	30.40	33.85	34.25	69336	1051952
42	40	B	15.0	30.13	33.71	34.13	33768					1085720
43	41	B	15.0	30.48	33.77	34.03	30464	30.30	33.74	34.08	64232	1116184
44	48	I	9.0	32.63	34.99	34.82	317064					1433312
45	49	P0	9.0	31.61	34.24	34.23	114528	32.09	34.60	34.51	431592	1547840
46	44	B	14.7	30.99	34.58	34.67	31640					1579480
47	45	B	14.7	30.83	34.15	34.46	32688	30.91	34.36	34.56	64328	1612168
48	46	B	14.7	31.27	34.71	34.94	33304					33304
49	47	B	14.7	30.73	34.36	34.57	36968	30.99	34.53	34.75	70272	70272
50	54	P1	7.8	32.46	34.82	34.75	111648					181920
51	55	P2	8.9	31.75	34.27	34.44	88560	32.09	34.54	34.59	200208	270480
52	50	B	13.0	30.94	34.71	34.71	40672					311152
53	51	B	13.0	30.83	34.07	34.14	38088	30.89	34.38	34.42	78760	349240
54	52	B	13.0	31.15	34.57	34.65	35272					384512
55	53	B	12.7	31.37	34.19	34.35	32664	31.26	34.38	34.50	67936	417176
56	60	P1	8.3	31.95	34.44	34.46	106976					524152
57	61	P2	8.2	32.05	34.22	34.39	97496	32.00	34.33	34.42	204472	621648
58	56	B	13.0	31.45	34.65	34.85	36416					658064
59	57	B	13.0	31.09	34.24	34.52	36256	31.27	34.44	34.68	72672	694320
60	58	B	12.7	31.26	34.47	34.59	32936					727256
61	59	B	12.7	31.06	34.19	34.39	34648	31.16	34.33	34.40	67584	761904
62	66	P1	8.4	31.71	34.02	34.26	106600					868504
63	67	P2	8.9	31.40	33.77	34.20	90600	31.55	33.90	34.23	197200	959104
64	62	B	12.7	31.65	34.33	34.49	32928					992032
65	63	B	12.7	31.11	33.92	34.23	35736	31.37	34.12	34.36	68664	1027768
66	64	B	12.7	31.39	34.14	34.32	34168					1061936
67	65	B	13.0	30.65	33.84	34.16	40656	31.00	33.99	34.24	74824	1102592
68	72	I	7.5	33.47	35.84	35.33	353440					1456096
69	73	P0	8.0	32.32	34.69	34.64	132864	32.86	35.23	34.97	486304	1588960
70	68	B	13.0	31.17	35.12	35.24	42832					1631792
71	69	B	12.7	31.90	34.71	34.99	32696	31.52	34.91	35.11	75528	1664488
72	70	B	12.7	32.13	35.30	35.27	28384					28384
73	71	B	12.7	31.96	34.77	34.82	29352	32.05	35.03	35.04	57736	57736
74	78	P1	7.8	32.15	34.96	34.80	105240					162976
75	79	P2	7.8	32.13	34.53	34.68	95624	32.14	34.74	34.74	200864	258600
76	74	B	13.0	32.32	35.57	35.40	29424					288024
77	75	B	12.7	31.41	34.42	34.60	33568	31.84	34.96	34.98	62992	321592
78	76	B	13.0	31.63	35.21	35.06	32360					353952
79	77	B	13.0	30.91	34.38	34.54	36912	31.26	34.78	34.79	69272	390864
80	84	P1	8.9	31.47	34.04	34.41	101712					492576
81	85	P2	8.5	31.65	34.09	34.37	93408	31.56	34.07	34.39	195120	585984
82	80	B	13.0	30.92	34.54	34.85	39800					625784
83	81	B	13.0	31.30	34.46	34.68	35776	31.11	34.50	34.76	75576	661560
84	82	B	13.0	31.13	34.42	34.68	33376					694936
85	83	B	13.0	31.47	34.47	34.64	30096	31.30	34.45	34.66	63472	725032
86	90	P1	9.3	31.33	33.69	33.99	101872					826904
87	91	P2	10.7	30.55	33.26	33.76	82184	30.92	33.47	33.88	184056	909088
88	86	B	15.7	30.49	33.70	34.24	31632					940720
89	87	B	16.0	30.29	33.81	34.28	33104	30.39	33.76	34.26	64736	973824
90	88	B	16.0	30.30	33.71	34.17	31600					1005424
91	89	B	16.0	30.08	33.51	34.06	30736	30.19	33.61	34.11	62336	1036160
92	96	I	9.0	32.42	34.72	34.55	336248					1372472
93	97	P0	9.0	31.35	33.82	33.93	119496	31.85	34.24	34.23	455744	1491968
94	92	B	15.7	31.14	34.55	34.55	28616					1520584
95	93	B	15.7	30.37	33.86	34.16	34288	30.74	34.19	34.35	62904	1554872
96	94	B	15.7	31.53	34.80	34.81	29520					29520
97	95	B	15.7	30.51	34.02	34.26	34000	30.99	34.39	34.53	63520	63520
98	102	P1	9.3	31.16	33.96	33.96	103792					167312
99	103	P2	7.5	32.22	34.32	34.35	106256	31.65	34.13	34.15	210048	273568
100	98	B	13.0	30.84	34.42	34.52	39864					313432
101	99	B	12.7	31.89	34.59	34.50	29656	31.33	34.50	34.51	69520	343088
102	100	B	13.0	30.73	34.11	34.16	36584					379672
103	101	B	12.7	31.56	34.37	34.34	26480	31.12	34.24	34.25	63064	406152
104	108	P1	8.0	32.00	34.22	34.46	111080					517232
105	109	P2	9.2	30.96	33.48	34.01	86768	31.45	33.83	34.23	197848	604000
106	104	B	13.0	30.68	33.93	34.11	42136					646136
107	105	B	12.7	31.23	34.24	34.53	34984	30.95	34.08	34.32	77120	681120
108	106	B	12.7	31.40	34.05	34.35	29592					710712
109	107	B	13.0	30.53	33.80	34.07	40744	30.94	33.92	34.21	70336	751456
110	114	P1	9.3	31.17	33.53	33.99	98672					850128
111	115	P2	8.8	31.37	33.63	34.04	101536	31.27	33.58	34.01	200208	951664
112	110	B	14.0	30.60	33.67	33.99	30064					981728
113	111	B	14.0	30.48	33.43	33.85	32120	30.54	33.55	33.92	62184	1013848
114	112	B	14.0	30.45	33.66	34.04	33360					1047208
115	113	B	14.0	30.26	33.58	34.07	36408	30.35	33.62	34.06	69768	1083616
116	120	I	9.0	32.53	34.73	34.65	334624					1418304
117	121	P0	9.0	31.45	33.90	34.02	121448	31.96	34.29	34.32	456072	1539752
118	116	B	14.0	31.14	34.43	34.53	31856					1571608
119	117	B	14.0	31.00	34.15	34.45	33576	31.07	34.29	34.49	65432	1605184
120	118	B	14.0	31.27	34.76	34.85	35112					35112
121	119	B	14.0	30.94	34.11	34.46	32696	31.10	34.43	34.65	67808	67808
122	126	P1	9.1	31.47	33.90	34.05	101784					169592
123	127	P2	8.3	31.70	34.22	34.22	97056	31.58	34.06	34.13	198840	266648
124	122	B	13.0	31.20	34.64	34.65	34080					300728
125	123	B	13.0	30.78	34.22	34.33	38808	30.98	34.43	34.49	72888	339536
126	124	B	13.0	30.71	34.20	34.28	36784					376320
127	125	B	12.7	30.95	34.27	34.39	32960	30.83	34.24	34.33	69744	409280
128	132	P1	9.6	30.98	33.60	33.78	99464					508744
129	133	P2	9.2	31.06	33.54	33.72	93800	31.02	33.57	33.75	193264	602544
130	128	B	15.0	30.62	33.80	34.04	33320					635864
131	129	B	15.0	30.68	34.09	34.22	34296	30.65	33.94	34.13	67616	670160
132	130	B	14.7	30.57	33.82	33.98	30056					700216
133	131	B	14.3	30.84	33.85	34.00	25512	30.70	33.83	33.99	55568	725728
134	138	P1	8.9	31.30	33.50	33.77	110200					835928
135	139	P2	8.7	31.34	33.38	33.67	102232	31.32	33.44	33.72	212432	938160
136	134	B	13.7	30.85	33.54	33.74	28960					967120
137	135	B	13.7	30.44	33.28	33.56	31632	30.64	33.41	33.64	60592	998752
138	136	B	13.7	30.47	33.43	33.72	33624					1032376
139	137	B	13.7	30.38	33.33	33.68	34552	30.43	33.38	33.70	68176	1066928
140	144	I	9.3	31.99	34.45	34.12	348272					1415264
141	145	P0	9.0	31.07	33.63	33.59	127392	31.51	34.02	33.85	475664	1542656
142	140	B	14.0	31.13	34.66	34.58	36920					1579576
143	141	B	14.0	30.83	33.97	34.05	34040	30.98	34.30	34.31	70960	1613616
144	142	B	14.0	31.22	34.53	34.45	28672					28672
145	143	B	13.7	30.69	33.79	33.89	28280	30.95	34.14	34.16	56952	56952
146	150	P1	8.6	31.16	33.99	34.09	106736					163688
147	151	P2	8.3	31.20	33.96	34.11	99200	31.18	33.97	34.10	205936	262888
148	146	B	13.0	31.23	34.50	34.40	29944					292832
149	147	B	13.0	30.40	33.62	33.80	34872	30.80	34.04	34.09	64816	327704
150	148	B	13.0	30.65	34.30	34.36	34888					362592
151	149	B	13.0	30.04	33.71	33.96	42176	30.34	33.99	34.15	77064	404768
152	156	P1	9.9	30.97	33.44	33.80	101672					506440
153	157	P2	9.3	31.20	33.57	33.93	94752	31.09	33.50	33.87	196424	601192
154	152	B	15.0	30.36	33.67	33.92	31584					632776
155	153	B	14.7	30.65	33.64	33.97	29464	30.50	33.66	33.95	61048	662240
156	154	B	15.0	30.51	33.67	33.94	31680					693920
157	155	B	15.0	30.63	33.70	34.11	31376	30.57	33.69	34.03	63056	725296
158	162	P1	8.8	31.48	33.56	33.78	110064					835360
159	163	P2	9.4	31.20	33.41	33.74	96272	31.34	33.48	33.76	206336	931632
160	158	B	14.0	30.57	33.42	33.75	31488					963120
161	159	B	14.0	30.73	33.51	33.88	29936	30.65	33.47	33.82	61424	993056
162	160	B	14.0	30.57	33.50	33.85	29528					1022584
163	161	B	13.7	30.89	33.61	33.93	29448	30.73	33.56	33.89	58976	1052032
164	168	I	9.6	32.04	34.59	34.19	336136					1388232
165	169	P0	10.0	30.91	33.67	33.65	116064	31.44	34.11	33.91	452200	1504296
166	164	B	14.0	31.08	34.25	34.32	29416					1533712
167	165	B	14.0	30.47	33.84	34.13	33816	30.76	34.04	34.22	63232	1567528
168	166	B	14.0	30.78	34.45	34.47	34952					34952
169	167	B	14.0	30.35	33.77	33.99	35712	30.56	34.10	34.22	70664	70664
170	174	P1	8.6	31.57	34.28	33.96	111096					181760
171	175	P2	8.5	31.53	33.92	33.86	98528	31.55	34.10	33.91	209624	280288
172	170	B	14.0	31.54	34.79	34.41	30104					310392
173	171	B	14.0	30.81	33.83	33.82	33680	31.16	34.28	34.11	63784	344072
174	172	B	14.0	31.03	34.48	34.25	32840					376912
175	173	B	14.0	30.71	33.90	33.88	28888	30.87	34.18	34.06	61728	405800
176	180	P1	8.7	31.36	33.66	33.70	111448					517248
177	181	P2	8.6	31.28	33.53	33.67	104480	31.32	33.59	33.68	215928	621728
178	176	B	14.0	31.27	34.05	33.96	28704					650432
179	177	B	14.0	30.88	33.64	33.79	29680	31.07	33.84	33.87	58384	680112
180	178	B	14.0	31.12	33.91	33.93	28152					708264
181	179	B	13.7	30.80	33.56	33.68	28616	30.96	33.73	33.80	56768	736880
182	186	P1	8.8	31.16	33.36	33.45	120896					857776
183	187	P2	8.6	31.21	33.35	33.61	111016	31.18	33.36	33.53	231912	968792
184	182	B	14.0	30.65	33.54	33.68	34024					1002816
185	183	B	14.0	30.42	33.51	33.74	35400	30.53	33.53	33.71	69424	1038216
186	184	B	14.0	30.44	33.42	33.55	29512					1067728
187	185	B	14.0	30.29	33.32	33.57	30072	30.36	33.37	33.56	59584	1097800
188	192	I	8.2	32.89	35.18	34.69	370616					1468480
189	193	P0	8.0	32.11	34.15	34.04	151888	32.48	34.64	34.35	522504	1620368
190	188	B	14.0	31.36	34.79	34.69	30520					1650888
191	189	B	14.0	30.70	33.75	34.10	33200	31.02	34.24	34.39	63720	1684088
192	190	B	14.0	31.26	34.72	34.66	31472					31472
193	191	B	14.0	30.59	33.94	34.13	35352	30.91	34.31	34.39	66824	66824
194	198	P1	8.8	31.77	34.37	34.00	109032					175856
195	199	P2	9.9	31.06	34.15	34.12	95232	31.40	34.26	34.06	204264	271088
196	194	B	15.0	30.97	34.80	34.66	33144					304232
197	195	B	15.0	30.94	34.68	34.65	33256	30.95	34.74	34.65	66400	337488
198	196	B	15.0	30.69	34.37	34.20	34456					371944
199	197	B	15.0	30.95	34.66	34.56	31768	30.82	34.51	34.38	66224	403712
200	204	P1	9.0	31.33	34.00	33.95	99400					503112
201	205	P2	10.0	30.68	33.54	33.71	98984	30.99	33.77	33.83	198384	602096
202	200	B	15.0	30.28	33.97	34.05	32752					634848
203	201	B	15.0	30.05	33.86	33.87	36992	30.16	33.91	33.96	69744	671840
204	202	B	15.0	30.45	34.13	34.18	32816					704656
205	203	B	15.0	29.98	33.76	33.83	36240	30.21	33.94	34.00	69056	740896
206	210	P1	11.4	29.85	33.05	33.13	80880					821776
207	211	P2	12.0	29.54	32.83	33.04	84080	29.69	32.94	33.09	164960	905856
208	206	B	18.0	29.33	33.21	33.43	29640					935496
209	207	B	18.0	29.19	33.17	33.40	29880	29.26	33.19	33.42	59520	965376
210	208	B	18.0	28.99	33.03	33.17	29576					994952
211	209	B	18.0	28.74	32.95	33.23	32896	28.87	32.99	33.20	62472	1027848
212	216	I	10.0	31.50	34.02	33.73	344288					1372200
213	217	P0	10.0	30.49	33.20	33.22	120896	30.97	33.59	33.47	465184	1493096
214	212	B	18.0	29.26	33.49	33.57	31952					1525048
215	213	B	18.0	29.37	33.55	33.61	31392	29.31	33.52	33.59	63344	1556440
216	214	B	18.0	29.61	33.84	33.79	29416					29416
217	215	B	17.7	29.53	33.42	33.55	30216	29.57	33.62	33.67	59632	59632
218	222	P1	10.0	30.29	33.21	33.26	92864					152496
219	223	P2	8.8	31.02	33.59	33.52	97952	30.64	33.40	33.39	190816	250448
220	218	B	15.0	30.18	33.96	33.82	36656					287104
221	219	B	15.0	30.15	33.65	33.63	35048	30.16	33.81	33.72	71704	322152
222	220	B	15.0	29.97	33.69	33.58	37160					359312
223	221	B	15.0	30.29	33.79	33.76	32360	30.13	33.74	33.67	69520	391672
224	228	P1	9.2	30.81	33.40	33.31	100824					492496
225	229	P2	10.6	29.95	32.87	33.13	87544	30.36	33.13	33.22	188368	580040
226	224	B	15.7	29.76	33.12	33.23	32128					612168
227	225	B	16.0	29.52	33.39	33.48	35208	29.64	33.25	33.34	67336	647376
228	226	B	15.7	29.80	33.41	33.46	33064					680440
229	227	B	15.3	29.79	32.97	33.16	26944	29.79	33.18	33.31	60008	707384
230	234	P1	9.1	30.49	32.97	33.19	104584					811968
231	235	P2	8.6	30.83	33.16	33.21	110328	30.66	33.07	33.20	214912	922296
232	230	B	14.0	29.96	33.38	33.40	37864					960160
233	231	B	14.0	29.67	33.17	33.20	39184	29.81	33.27	33.30	77048	999344
234	232	B	14.0	29.57	33.21	33.24	39856					1039200
235	233	B	14.0	29.73	33.14	33.28	34952	29.65	33.17	33.26	74808	1074152
236	240	I	8.5	32.34	34.75	34.24	376912					1451128
237	241	P0	9.0	31.14	33.70	33.61	132344	31.70	34.20	33.91	509256	1583472
238	236	B	14.0	30.71	34.33	34.17	30488					1613960
239	237	B	14.0	30.57	33.78	33.75	29624	30.64	34.04	33.95	60112	1643584
240	238	B	14.0	31.16	34.50	34.26	27184					27184
241	239	B	14.0	30.61	33.81	33.89	28568	30.88	34.14	34.07	55752	55752
242	246	P1	9.1	31.00	33.69	33.77	102952					158704
243	247	P2	8.1	31.63	34.12	34.01	99632	31.31	33.90	33.89	202584	258336
244	242	B	13.0	31.40	34.71	34.48	32320					290856
245	243	B	13.0	30.53	33.78	33.80	37016	30.94	34.22	34.13	69336	327872
246	244	B	13.0	30.75	34.33	34.28	36408					364080
247	245	B	13.0	30.56	34.25	34.17	39784	30.65	34.29	34.22	76192	403864
248	252	P1	10.0	30.30	33.02	33.28	94168					498032
249	253	P2	11.0	30.15	33.19	33.42	80688	30.22	33.11	33.35	174856	578720
250	248	B	15.7	29.93	33.35	33.57	31184					609904
251	249	B	15.7	30.67	33.87	33.93	27000	30.28	33.60	33.75	58184	636904
252	250	B	15.3	30.23	33.29	33.47	23976					660880
253	251	B	15.7	30.20	33.51	33.67	26776	30.21	33.40	33.57	50752	687656
254	258	P1	9.2	30.45	33.12	33.22	111168					798824
255	259	P2	10.0	30.03	32.74	33.02	94904	30.23	32.93	33.12	206072	893728
256	254	B	15.0	29.40	32.97	33.18	37440					931168
257	255	B	15.0	29.44	33.02	33.33	36560	29.42	33.00	33.25	74000	967728
258	256	B	15.0	29.51	33.15	33.34	34344					1002072
259	257	B	15.0	29.53	32.84	33.20	29800	29.52	32.99	33.27	64144	1031872

260	264	I	11.8	30.54	33.71	33.26	336416					1368352
261	265	P0	12.0	29.32	32.71	32.68	102848	29.89	33.19	32.96	439264	1471200
262	260	B	16.5	30.26	33.87	33.77	27736					1498936
263	261	B	16.3	29.65	33.10	33.23	26664	29.94	33.47	33.49	54400	1525600
264	262	B	16.5	30.32	34.01	33.85	27104					27104
265	263	B	16.5	29.26	32.92	33.16	27856	29.76	33.43	33.49	54960	54960
266	270	P1	9.3	30.45	33.42	33.24	99024					153984
267	271	P2	10.4	29.96	33.07	32.96	96912	30.20	33.24	33.10	195936	250896
268	266	B	16.5	30.53	33.87	33.57	25288					276184
269	267	B	16.5	29.30	32.89	32.86	28776	29.87	33.35	33.20	54064	304960
270	268	B	16.5	29.97	33.64	33.45	26824					331784
271	269	B	16.5	29.20	33.04	33.04	26584	29.57	33.33	33.24	53408	358368
272	276	P1	10.0	29.91	32.84	33.08	87720					446088
273	277	P2	10.4	29.74	32.64	32.81	93944	29.82	32.74	32.95	181664	540032
274	272	B	17.5	29.90	33.13	33.18	23384					563416
275	273	B	17.5	29.41	32.73	32.95	25360	29.65	32.93	33.07	48744	588776
276	274	B	17.3	29.75	33.08	33.28	22144					610920
277	275	B	17.2	29.18	32.64	32.83	23128	29.45	32.86	33.05	45272	634048
278	282	P1	10.4	29.69	32.40	32.77	90912					724960
279	283	P2	10.2	29.98	32.44	32.75	95616	29.83	32.42	32.76	186528	820576
280	278	B	17.3	29.43	32.58	32.87	24528					845104
281	279	B	17.5	29.24	32.60	32.87	25416	29.34	32.59	32.87	49944	870520
282	280	B	17.5	29.08	32.54	32.85	25312					895832
283	281	B	17.5	29.29	32.61	32.87	24144	29.19	32.57	32.86	49456	919976
284	288	I	10.0	31.55	33.99	33.63	361568					1281608
285	289	P0	10.0	30.21	32.88	32.87	126232	30.83	33.40	33.23	487800	1407840
286	284	B	17.3	31.03	34.07	33.98	22824					1430664
287	285	B	17.3	30.52	33.30	33.47	23080	30.77	33.67	33.71	45904	1453744
288	286	B	17.2	30.94	33.88	33.88	21784					21784
289	287	B	17.2	30.08	32.97	33.17	21832	30.49	33.40	33.51	43616	43616
290	294	P1	9.8	29.83	32.81	32.88	95976					139592
291	295	P2	10.1	29.97	33.12	33.07	95072	29.90	32.96	32.97	191048	234664
292	290	B	17.5	30.32	33.75	33.61	24696					259360
293	291	B	17.5	29.33	32.88	32.95	29024	29.80	33.30	33.27	53720	288384
294	292	B	17.5	29.38	33.37	33.38	30632					319016
295	293	B	17.5	29.42	33.33	33.17	25528	29.40	33.35	33.27	56160	344544
296	298	P1	10.7	29.32	32.29	32.63	82136					426680
297	299	P2	11.5	29.47	32.56	32.91	78760	29.39	32.42	32.77	160896	505440
298	296	B	17.8	29.16	32.39	32.69	22184					527624
299	297	B	17.5	29.46	32.76	32.97	21480	29.31	32.57	32.83	43664	549104

Table Tennis : 4.0000 Mbits/sec : Results averaged over sequence

Total : 300 pictures
SNR for luminance 31.05 dB
SNR for chrominance (Cb) 39.27 dB
SNR for chrominance (Cr) 39.81 dB
Number of bits
Coefficients Y 11568000 bits
Cb 1016682 bits
Cr 785608 bits
total 13370290 bits
Motion vectors 4179342 bits
Overhead 2420912 bits
TOTAL 19970544 bits
Mean value of Q scale 7.94

I-picture : 13 pictures
SNR for luminance 32.47 dB
SNR for chrominance (Cb) 39.22 dB
SNR for chrominance (Cr) 39.89 dB
Number of bits
Coefficients Y 2791795 bits
Cb 320402 bits
Cr 271781 bits
total 3383978 bits
Motion vectors 0 bits
Overhead 52046 bits
TOTAL 3436024 bits
Mean value of Q scale 6.64

B-picture : 198 pictures
SNR for luminance 30.85 dB
SNR for chrominance (Cb) 39.32 dB
SNR for chrominance (Cr) 39.87 dB
Number of bits
Coefficients Y 2547586 bits
Cb 208448 bits
Cr 132880 bits
total 2888914 bits
Motion vectors 3076378 bits
Overhead 1536572 bits
TOTAL 7501864 bits
Mean value of Q scale 8.74

P0-picture : 13 pictures
SNR for luminance 31.34 dB
SNR for chrominance (Cb) 38.95 dB
SNR for chrominance (Cr) 39.45 dB
Number of bits
Coefficients Y 1257207 bits
Cb 82317 bits
Cr 71504 bits
total 1411028 bits
Motion vectors 105131 bits
Overhead 123729 bits
TOTAL 1639888 bits
Mean value of Q scale 6.62

P1-picture : 38 pictures
SNR for luminance 31.42 dB
SNR for chrominance (Cb) 39.25 dB
SNR for chrominance (Cr) 39.81 dB
Number of bits
Coefficients Y 2854396 bits
Cb 258036 bits
Cr 193715 bits
total 3306147 bits
Motion vectors 412233 bits
Overhead 324628 bits
TOTAL 4043008 bits
Mean value of Q scale 6.23

P2-picture : 38 pictures
SNR for luminance 31.23 dB
SNR for chrominance (Cb) 39.14 dB
SNR for chrominance (Cr) 39.62 dB
Number of bits
Coefficients Y 2117016 bits
Cb 147479 bits
Cr 115728 bits
total 2380223 bits
Motion vectors 585600 bits
Overhead 382977 bits
TOTAL 3348800 bits
Mean value of Q scale 6.40

Table Tennis : 4.0000 Mbits/sec : Statistics of each field and frame

				field statistics				frame statistics				cumulative
COD	INP	T	Qsc	SN-Y	SN-Cb	SN-Cr	bits	SN-Y	SN-Cb	SN-Cr	bits	bit count
0	0	I	8.4	29.98	38.35	39.67	308344					308504
1	1	P0	8.0	29.10	37.81	39.20	238816	29.52	38.07	39.43	547160	547320
2	6	P1	8.3	28.19	38.38	39.74	91400					638720
3	7	P2	10.9	26.95	38.08	39.41	68720	27.52	38.23	39.57	160120	707440
4	2	B	13.0	28.42	38.35	39.68	20280					727720
5	3	B	13.0	27.73	37.81	39.15	20720	28.06	38.08	39.41	41000	748440
6	4	B	13.0	27.96	38.37	39.72	24952					773392
7	5	B	13.0	27.77	37.97	39.30	22088	27.86	38.17	39.51	47040	795480
8	12	P1	11.2	26.68	38.03	39.26	106600					902080
9	13	P2	9.8	27.26	38.04	39.29	114656	26.96	38.03	39.28	221256	1016736
10	8	B	14.3	27.02	38.44	39.76	26368					1043104
11	9	B	14.0	27.16	38.22	39.54	22120	27.09	38.33	39.65	48488	1065224
12	10	B	14.0	26.68	38.21	39.55	22504					1087728
13	11	B	14.0	26.75	38.17	39.45	22528	26.71	38.19	39.50	45032	1110256
14	18	P1	10.7	26.87	38.07	39.17	117032					1227288
15	19	P2	11.3	26.79	38.34	39.35	108264	26.83	38.20	39.26	225296	1335552
16	14	B	15.3	26.20	38.10	39.19	25928					1361480
17	15	B	15.0	26.15	38.08	39.22	26712	26.17	38.09	39.21	52640	1388192
18	16	B	16.3	25.80	38.23	39.32	32776					1420968
19	17	B	17.0	25.60	38.30	39.32	32432	25.70	38.26	39.32	65208	1453400
20	24	I	10.6	28.84	38.02	39.36	271968					1725432
21	25	P0	11.0	26.82	37.62	38.83	163600	27.71	37.81	39.09	435568	1889032
22	20	B	16.3	25.97	38.36	39.52	34424					1923456
23	21	B	15.0	26.31	38.30	39.43	24928	26.14	38.33	39.48	59352	1948384
24	22	B	16.3	26.43	38.35	39.68	32280					32280
25	23	B	15.3	26.36	38.25	39.52	28232	26.39	38.30	39.60	60512	60512
26	30	P1	10.8	27.00	37.90	38.99	115336					175848
27	31	P2	12.4	26.09	37.94	38.87	106816	26.52	37.92	38.93	222152	282664
28	26	B	16.3	26.55	38.05	39.22	27784					310448
29	27	B	16.3	25.81	37.83	38.97	31176	26.16	37.94	39.09	58960	341624
30	28	B	16.0	26.70	38.12	39.22	27584					369208
31	29	B	17.0	25.64	37.95	38.97	26944	26.14	38.04	39.09	54528	396152
32	36	P1	10.0	27.20	37.97	39.01	112824					508976
33	37	P2	10.8	26.65	37.90	38.94	121008	26.92	37.93	38.97	233832	629984
34	32	B	14.0	26.61	38.04	39.05	24384					654368
35	33	B	15.3	25.69	38.02	39.07	30160	26.12	38.03	39.06	54544	684528
36	34	B	14.0	26.71	38.09	39.08	28616					713144
37	35	B	15.0	25.70	37.94	39.03	28960	26.18	38.01	39.05	57576	742104
38	42	P1	9.9	27.42	37.93	38.96	111888					853992
39	43	P2	10.3	27.01	37.81	38.91	118976	27.21	37.87	38.94	230864	972968
40	38	B	14.0	26.64	38.11	39.08	29096					1002064
41	39	B	14.0	26.37	37.96	38.99	29920	26.50	38.03	39.02	59016	1031984
42	40	B	14.0	26.89	38.10	39.04	30680					1062664
43	41	B	14.0	26.35	37.95	38.97	30368	26.61	38.02	39.00	61048	1093032
44	48	I	9.4	29.65	38.22	39.55	269024					1362120
45	49	P0	9.0	28.41	38.06	39.32	151704	28.99	38.14	39.44	420728	1513824
46	44	B	16.0	26.06	38.01	39.05	36368					1550192
47	45	B	15.3	26.17	38.12	39.15	34448	26.12	38.06	39.10	70816	1584640
48	46	B	16.0	26.10	38.08	39.19	43704					43704
49	47	B	16.0	26.10	38.13	39.19	42856	26.10	38.10	39.19	86560	86560
50	54	P1	9.9	28.75	38.54	39.70	92472					179032
51	55	P2	7.1	30.29	39.04	40.29	97992	29.45	38.78	39.98	190464	277024
52	50	B	13.0	27.21	38.47	39.75	53432					330456
53	51	B	13.0	27.77	38.60	39.87	48952	27.48	38.53	39.81	102384	379408
54	52	B	13.0	28.13	38.65	39.89	42016					421424
55	53	B	12.3	28.65	38.81	40.13	41664	28.38	38.73	40.01	83680	463088
56	60	P1	8.4	29.86	38.98	40.06	85024					548112
57	61	P2	9.0	30.00	39.16	40.24	61496	29.93	39.07	40.15	146520	609608
58	56	B	11.0	29.20	39.13	40.29	43872					653480
59	57	B	12.0	28.87	39.08	40.15	43976	29.03	39.11	40.22	87848	697456
60	58	B	11.3	29.28	39.08	40.16	42944					740400
61	59	B	11.0	29.07	39.06	40.18	41616	29.17	39.07	40.17	84560	782016

62	66	P1	7.7	30.95	39.42	40.18	83136					865152
63	67	P2	7.8	31.29	39.69	40.44	65816	31.11	39.55	40.30	148952	930968
64	62	B	11.0	29.55	39.31	40.27	40056					971024
65	63	B	11.0	30.12	39.43	40.42	41048	29.83	39.37	40.35	81104	1012072
66	64	B	11.0	29.99	39.42	40.30	39408					1051480
67	65	B	11.0	30.36	39.44	40.34	36840	30.17	39.43	40.32	76248	1088320
68	72	I	8.1	32.66	39.74	40.64	174856					1263240
69	73	P0	8.0	31.87	39.87	40.71	47848	32.25	39.80	40.67	222704	1311088
70	68	B	11.0	30.78	39.81	40.71	38568					1349656
71	69	B	11.0	31.09	39.98	40.79	39224	30.92	39.90	40.75	77792	1388880
72	70	B	11.0	31.54	40.11	40.93	36120					36120
73	71	B	11.0	31.78	40.24	41.19	33224	31.66	40.18	41.06	69344	69344
74	78	P1	4.6	33.92	40.47	41.42	117408					186752
75	79	P2	4.1	34.25	40.81	41.78	96240	34.08	40.63	41.60	213648	282992
76	74	B	6.3	32.88	40.56	41.62	57640					340632
77	75	B	6.3	33.07	40.61	41.68	56872	32.97	40.59	41.65	114512	397504
78	76	B	6.3	33.16	40.61	41.71	54240					451744
79	77	B	5.3	33.75	40.85	41.86	55112	33.44	40.73	41.79	109352	506856
80	84	P1	4.5	34.50	40.77	41.51	104400					611256
81	85	P2	4.2	34.82	40.98	41.88	87368	34.65	40.87	41.69	191768	698624
82	80	B	5.3	34.07	40.96	41.97	58176					756800
83	81	B	6.0	34.05	40.93	41.82	54272	34.06	40.94	41.89	112448	811072
84	82	B	6.0	34.00	40.84	41.80	54392					865464
85	83	B	5.7	34.22	40.98	41.85	50728	34.11	40.91	41.83	105120	916192
86	90	P1	4.9	34.78	40.72	41.47	100704					1016896
87	91	P2	4.7	35.13	40.92	41.70	80896	34.95	40.82	41.58	181600	1097792
88	86	B	6.0	34.32	40.83	41.58	50768					1148560
89	87	B	6.0	34.54	40.91	41.58	57328	34.43	40.87	41.58	108096	1205888
90	88	B	6.0	34.55	40.80	41.49	58080					1263968
91	89	B	6.0	34.61	40.79	41.45	51184	34.58	40.79	41.47	109264	1315152
92	96	I	6.2	34.95	40.44	41.21	163608					1478824
93	97	P0	6.0	34.49	40.61	41.20	55280	34.71	40.52	41.20	218888	1534104
94	92	B	6.7	34.76	41.01	41.51	50160					1584264
95	93	B	7.0	34.64	40.94	41.33	52624	34.70	40.98	41.42	102784	1636888
96	94	B	7.0	34.69	40.89	41.43	52296					52296
97	95	B	6.0	34.95	41.06	41.64	51808	34.82	40.98	41.53	104104	104104
98	102	P1	5.0	34.76	40.28	40.75	106792					210896
99	103	P2	4.8	35.07	40.54	41.00	77800	34.91	40.41	40.87	184592	288696
100	98	B	6.7	34.78	40.77	41.26	49624					338320
101	99	B	7.0	34.66	40.64	41.08	52216	34.72	40.70	41.16	101840	390536
102	100	B	7.0	34.56	40.43	40.99	52288					442824
103	101	B	6.0	34.85	40.46	41.08	51544	34.70	40.45	41.03	103832	494368
104	108	P1	4.7	35.04	40.11	40.61	109760					604128
105	109	P2	5.1	35.12	40.26	40.84	72600	35.08	40.19	40.72	182360	676728
106	104	B	6.7	34.75	40.38	40.86	49512					726240
107	105	B	7.0	34.57	40.25	40.64	53144	34.66	40.31	40.75	102656	779384
108	106	B	7.0	34.68	40.27	40.65	50304					829688
109	107	B	6.0	34.93	40.22	40.82	50440	34.80	40.25	40.73	100744	880128
110	114	P1	4.4	35.38	40.29	40.95	114240					994368
111	115	P2	4.5	35.14	40.25	40.75	78512	35.26	40.27	40.85	192752	1072880
112	110	B	6.0	34.98	40.35	40.91	54648					1127528
113	111	B	6.3	34.85	40.25	40.84	54408	34.91	40.30	40.88	109056	1181936
114	112	B	6.3	35.01	40.35	40.92	53696					1235632
115	113	B	6.0	35.01	40.33	40.88	48976	35.01	40.34	40.90	102672	1284608
116	120	I	4.7	35.61	40.31	40.94	210024					1494696
117	121	P0	5.0	34.86	40.35	40.95	65800	35.22	40.33	40.94	275824	1560496
118	116	B	6.0	35.01	40.36	41.01	53072					1613568
119	117	B	6.3	34.97	40.51	41.10	53392	34.99	40.44	41.06	106464	1666960
120	118	B	6.7	34.87	40.50	41.11	51296					51296
121	119	B	6.0	35.09	40.60	41.22	51136	34.98	40.55	41.17	102432	102432
122	126	P1	4.6	35.02	40.28	40.72	109072					211504
123	127	P2	4.7	35.09	40.32	40.89	81872	35.05	40.30	40.80	190944	293376
124	122	B	7.0	34.83	40.42	41.17	45056					338432
125	123	B	7.0	34.83	40.40	41.16	47344	34.83	40.41	41.16	92400	385776
126	124	B	7.0	34.85	40.36	41.14	46176					431952
127	125	B	6.3	34.92	40.36	41.13	45736	34.89	40.36	41.14	91912	477688

128	132	P1	4.9	34.87	40.13	40.51	108312					586000
129	133	P2	4.7	34.84	40.09	40.60	78992	34.86	40.11	40.55	187304	664992
130	128	B	7.0	34.62	40.09	40.73	44528					709520
131	129	B	7.0	34.66	40.28	40.86	46296	34.64	40.18	40.79	90824	755816
132	130	B	7.0	34.60	40.12	40.70	45760					801576
133	131	B	7.0	34.48	39.96	40.56	43680	34.54	40.04	40.63	89440	845256
134	138	P1	7.8	32.75	38.47	38.64	223144					1068400
135	139	P2	8.0	32.06	38.15	38.03	88936	32.39	38.30	38.32	312080	1157336
136	134	B	11.0	32.21	38.43	38.48	31896					1189232
137	135	B	11.0	31.79	38.08	37.87	29040	31.99	38.25	38.16	60936	1218272
138	136	B	11.0	32.27	38.48	38.60	26464					1244736
139	137	B	11.0	31.90	38.12	37.97	22000	32.08	38.30	38.27	48464	1266736
140	144	I	6.0	34.11	39.35	39.55	261440					1528240
141	145	P0	6.0	33.09	38.85	38.85	110856	33.57	39.10	39.19	372296	1639096
142	140	B	11.0	33.47	39.49	39.58	25424					1664520
143	141	B	11.0	32.86	38.89	38.70	27448	33.16	39.18	39.12	52872	1691968
144	142	B	11.0	33.47	39.53	39.62	27240					27240
145	143	B	11.0	32.91	38.89	38.78	24384	33.18	39.20	39.18	51624	51624
146	150	P1	4.3	33.77	39.56	39.83	79072					130696
147	151	P2	5.2	33.26	39.01	38.97	56032	33.51	39.28	39.38	135104	186728
148	146	B	7.0	33.61	39.64	39.83	31872					218600
149	147	B	7.0	33.25	39.04	39.06	33744	33.42	39.33	39.43	65616	252344
150	148	B	7.0	33.58	39.58	39.82	33096					285440
151	149	B	7.0	33.21	39.00	39.04	29272	33.39	39.28	39.41	62368	314712
152	156	P1	3.1	34.70	39.82	40.14	110776					425488
153	157	P2	3.4	34.64	39.73	39.88	105632	34.67	39.78	40.01	216408	531120
154	152	B	4.7	34.28	39.86	40.12	41608					572728
155	153	B	4.7	34.17	39.74	39.83	42304	34.23	39.80	39.97	83912	615032
156	154	B	4.0	34.44	39.89	40.18	45584					660616
157	155	B	3.7	34.46	39.82	40.05	50160	34.45	39.85	40.12	95744	710776
158	162	P1	2.6	35.37	40.13	40.60	115232					826008
159	163	P2	2.8	35.26	40.20	40.56	105640	35.31	40.16	40.58	220872	931648
160	158	B	3.3	34.98	40.10	40.49	49992					981640
161	159	B	3.7	34.81	40.10	40.37	44384	34.89	40.10	40.43	94376	1026024
162	160	B	3.3	34.94	40.12	40.53	50568					1076592
163	161	B	3.3	34.92	40.15	40.44	49304	34.93	40.14	40.48	99872	1125896
164	168	I	4.7	34.77	39.67	39.98	291984					1417944
165	169	P0	5.0	33.67	39.17	39.17	123288	34.19	39.41	39.56	415272	1541232
166	164	B	4.0	35.08	40.39	40.91	41952					1583184
167	165	B	4.0	34.90	40.19	40.48	42000	34.99	40.29	40.69	83952	1625184
168	166	B	4.7	34.96	40.46	40.95	38936					38936
169	167	B	4.3	34.80	40.22	40.45	39696	34.88	40.34	40.69	78632	78632
170	174	P1	3.4	34.73	39.99	40.44	101576					180208
171	175	P2	3.5	34.52	39.55	39.95	93144	34.62	39.76	40.19	194720	273352
172	170	B	5.0	34.32	40.06	40.43	33792					307144
173	171	B	5.0	34.07	39.54	39.83	33480	34.19	39.80	40.12	67272	340624
174	172	B	5.0	34.33	40.02	40.44	34232					374856
175	173	B	4.7	34.13	39.59	39.84	36360	34.23	39.80	40.13	70592	411216
176	180	P1	2.7	35.29	40.19	40.74	104312					515528
177	181	P2	2.8	35.15	40.02	40.48	96776	35.22	40.11	40.61	201088	612304
178	176	B	4.7	34.75	40.17	40.67	34400					646704
179	177	B	4.3	34.68	39.97	40.40	36336	34.71	40.07	40.53	70736	683040
180	178	B	4.3	34.87	40.19	40.76	36600					719640
181	179	B	4.0	34.77	39.99	40.45	33520	34.82	40.09	40.60	70120	753160
182	186	P1	2.3	35.69	40.35	40.94	107256					860416
183	187	P2	2.7	35.55	40.20	40.68	94760	35.62	40.28	40.81	202016	955176
184	182	B	4.0	35.23	40.33	40.95	39664					994840
185	183	B	4.0	35.15	40.16	40.65	41408	35.19	40.25	40.79	81072	1036248
186	184	B	4.0	35.24	40.34	40.92	39760					1076008
187	185	B	4.0	35.13	40.18	40.62	38304	35.18	40.26	40.77	78064	1114312
188	192	I	4.3	35.24	39.94	40.32	319512					1433888
189	193	P0	4.0	34.42	39.66	39.88	158776	34.81	39.80	40.10	478288	1592664
190	188	B	4.0	35.53	40.76	41.33	40224					1632888
191	189	B	4.0	35.34	40.35	40.80	40920	35.43	40.55	41.06	81144	1673808
192	190	B	4.0	35.50	40.70	41.31	42984					42984
193	191	B	4.0	35.33	40.34	40.78	40496	35.41	40.51	41.03	83480	83480

194	198	P1	4.8	33.69	38.98	39.35	324752					408232
195	199	P2	5.0	33.05	38.91	39.15	154536	33.36	38.94	39.25	479288	562768
196	194	B	8.0	31.86	39.08	39.22	55192					617960
197	195	B	8.0	31.68	38.74	38.85	52368	31.77	38.91	39.03	107560	670328
198	196	B	6.7	32.52	39.18	39.42	42496					712824
199	197	B	7.0	32.22	38.87	39.01	31552	32.37	39.02	39.21	74048	744376
200	204	P1	7.3	31.78	38.88	39.13	72952					817328
201	205	P2	10.8	30.35	38.49	38.52	42336	31.00	38.68	38.81	115288	859664
202	200	B	12.0	32.65	39.16	39.36	22224					881888
203	201	B	12.0	31.98	38.81	38.90	23064	32.30	38.98	39.12	45288	904952
204	202	B	12.0	32.10	39.09	39.23	23064					928016
205	203	B	12.0	31.29	38.68	38.77	20384	31.68	38.88	38.99	43448	948400
206	210	P1	5.5	32.51	38.91	39.06	93144					1041544
207	211	P2	5.6	32.32	38.55	38.81	89912	32.42	38.73	38.93	183056	1131456
208	206	B	8.0	32.42	39.03	39.24	26184					1157640
209	207	B	8.0	31.79	38.65	38.84	27776	32.09	38.83	39.04	53960	1185416
210	208	B	8.0	32.22	38.95	39.20	24352					1209768
211	209	B	8.0	31.86	38.60	38.80	24344	32.03	38.77	38.99	48696	1234112
212	216	I	5.0	33.80	39.44	39.76	316320					1550496
213	217	P0	5.0	33.00	39.13	39.17	148736	33.38	39.28	39.45	465056	1699232
214	212	B	8.0	33.29	39.83	40.14	25592					1724824
215	213	B	8.0	32.88	39.23	39.39	25440	33.08	39.52	39.75	51032	1750264
216	214	B	8.0	33.29	39.85	40.17	25880					25880
217	215	B	8.0	32.99	39.27	39.42	24296	33.14	39.55	39.77	50176	50176
218	222	P1	4.6	33.20	39.67	39.96	90512					140688
219	223	P2	4.7	32.97	39.14	39.31	83944	33.09	39.40	39.62	174456	224632
220	218	B	6.3	33.42	39.81	40.14	27336					251968
221	219	B	6.0	33.15	39.20	39.36	25616	33.28	39.49	39.74	52952	277584
222	220	B	6.3	33.31	39.77	40.06	26064					303648
223	221	B	6.0	33.05	39.16	39.33	25856	33.18	39.45	39.68	51920	329504
224	228	P1	4.7	33.01	39.58	39.89	85416					414920
225	229	P2	4.9	32.75	39.07	39.25	85040	32.87	39.32	39.55	170456	499960
226	224	B	6.0	33.28	39.67	39.98	25288					525248
227	225	B	6.0	33.07	39.15	39.35	23568	33.17	39.40	39.66	48856	548816
228	226	B	6.3	33.07	39.64	39.96	24840					573656
229	227	B	6.3	32.72	39.09	39.34	23968	32.89	39.35	39.64	48808	597624
230	234	P1	4.7	33.27	39.52	39.84	84888					682512
231	235	P2	4.8	33.16	39.15	39.38	85544	33.21	39.33	39.60	170432	768056
232	230	B	6.3	33.37	39.54	39.88	26288					794344
233	231	B	6.3	33.17	39.18	39.42	25128	33.27	39.36	39.64	51416	819472
234	232	B	6.3	33.13	39.57	39.83	28504					847976
235	233	B	6.3	32.96	39.17	39.43	26032	33.04	39.36	39.62	54536	874008
236	240	I	4.8	33.94	39.53	39.86	322784					1196856
237	241	P0	5.0	33.08	39.19	39.33	149832	33.49	39.35	39.59	472616	1346688
238	236	B	6.3	33.86	40.08	40.58	32160					1378848
239	237	B	6.3	33.46	39.49	39.77	32752	33.66	39.77	40.15	64912	1411600
240	238	B	6.3	33.70	40.00	40.49	34896					34896
241	239	B	6.0	33.42	39.46	39.77	32448	33.56	39.72	40.11	67344	67344
242	246	P1	5.7	32.57	39.53	39.79	94824					162168
243	247	P2	5.2	32.68	39.00	39.15	91528	32.63	39.26	39.46	186352	253696
244	242	B	7.0	32.62	39.79	40.14	34192					287888
245	243	B	7.3	32.30	39.22	39.28	35320	32.46	39.50	39.69	69512	323208
246	244	B	7.0	32.77	39.76	40.03	33656					356864
247	245	B	7.3	32.18	39.12	39.24	37232	32.46	39.43	39.62	70888	394096
248	252	P1	4.8	33.48	39.63	39.92	96728					490824
249	253	P2	5.4	32.78	38.86	38.95	93032	33.12	39.23	39.41	189760	583856
250	248	B	8.0	32.01	39.44	39.93	57872					641728
251	249	B	7.3	32.04	38.82	38.92	38944	32.03	39.12	39.39	96816	680672
252	250	B	6.3	33.06	39.66	40.01	35040					715712
253	251	B	7.3	32.33	39.03	39.20	38728	32.68	39.33	39.58	73768	754440
254	258	P1	6.7	32.36	38.80	39.10	76400					830840
255	259	P2	5.4	33.31	39.11	39.31	87248	32.81	38.95	39.20	163648	918088
256	254	B	10.0	31.56	39.27	39.64	40920					959008
257	255	B	10.0	31.32	38.96	39.15	43032	31.44	39.11	39.39	83952	1002040
258	256	B	10.0	31.92	39.33	39.66	35856					1037896
259	257	B	9.3	32.19	38.90	39.04	30088	32.05	39.11	39.34	65944	1067984

260	264	I	6.8	33.07	38.89	39.14	259088					1327136
261	265	P0	7.0	32.29	38.60	38.65	108856	32.66	38.74	38.89	367944	1435992
262	260	B	9.7	32.17	39.54	40.04	36440					1472432
263	261	B	7.7	32.84	39.27	39.50	37840	32.49	39.40	39.76	74280	1510272
264	262	B	8.2	32.41	39.45	39.86	37752					37752
265	263	B	7.2	32.55	39.14	39.23	38888	32.48	39.30	39.53	76640	76640
266	270	P1	8.0	32.40	38.99	39.05	77680					154320
267	271	P2	7.3	32.19	38.77	38.77	72008	32.30	38.88	38.91	149688	226328
268	266	B	8.7	32.39	39.22	39.44	31544					257872
269	267	B	8.7	31.90	38.76	38.76	36072	32.14	38.98	39.10	67616	293944
270	268	B	8.7	31.59	39.18	39.39	40640					334584
271	269	B	10.2	30.96	38.68	38.76	38376	31.26	38.92	39.07	79016	372960
272	276	P1	6.4	32.84	39.17	39.20	82960					455920
273	277	P2	6.7	32.19	38.60	38.88	80976	32.51	38.88	39.04	163936	536896
274	272	B	10.7	31.39	38.94	39.29	40592					577488
275	273	B	10.7	31.43	38.52	38.75	41072	31.41	38.72	39.01	81664	618560
276	274	B	8.2	32.28	39.08	39.39	40072					658632
277	275	B	7.5	32.29	38.82	38.89	39136	32.29	38.95	39.13	79208	697768
278	282	P1	6.5	32.12	38.74	38.97	80144					777912
279	283	P2	8.5	32.32	38.61	38.83	77872	32.22	38.67	38.90	158016	855784
280	278	B	7.7	32.58	39.04	39.48	32536					888320
281	279	B	7.7	32.14	38.81	39.06	39840	32.35	38.92	39.26	72376	928160
282	280	B	8.0	32.03	39.03	39.40	43864					972024
283	281	B	8.0	31.61	38.77	39.06	45352	31.82	38.90	39.23	89216	1017376
284	288	I	7.1	33.09	38.83	39.15	267072					1284512
285	289	P0	7.0	32.26	38.55	38.62	116496	32.65	38.69	38.88	383568	1401008
286	284	B	10.5	31.20	38.90	39.37	38328					1439336
287	285	B	10.7	30.93	38.78	39.04	37680	31.06	38.84	39.20	76008	1477016
288	286	B	9.3	31.38	39.20	39.72	39024					39024
289	287	B	8.7	31.43	38.77	39.05	38944	31.41	38.98	39.37	77968	77968
290	294	P1	7.6	32.07	38.61	39.07	80224					158192
291	295	P2	7.7	32.13	38.76	38.86	70552	32.10	38.68	38.96	150776	228744
292	290	B	9.7	31.10	39.02	39.37	36672					265416
293	291	B	10.5	30.89	38.64	38.76	37216	30.99	38.82	39.05	73888	302632
294	292	B	10.5	30.83	38.80	39.17	38112					340744
295	293	B	10.5	30.69	38.61	38.71	36912	30.76	38.70	38.93	75024	377656
296	298	P1	8.4	31.95	38.70	38.93	74616					452272
297	299	P2	6.9	32.01	38.71	38.83	75328	31.98	38.70	38.88	149944	527600
298	296	B	11.2	30.91	38.76	39.14	39560					567160
299	297	B	10.8	30.71	38.73	38.82	37488	30.81	38.75	38.98	77048	604648

Mobile and Calender : 4.0000 Mbits/sec : Results averaged over sequence

Total : 300 pictures
SNR for luminance 28.78 dB
SNR for chrominance (Cb) 33.75 dB
SNR for chrominance (Cr) 34.22 dB
Number of bits
Coefficients Y 12356261 bits
Cb 1548738 bits
Cr 1429227 bits
total 15334226 bits
Motion vectors 2680950 bits
Overhead 1971504 bits
TOTAL 19986680 bits
Mean value of Q scale 15.57

I-picture : 13 pictures
SNR for luminance 31.74 dB
SNR for chrominance (Cb) 34.82 dB
SNR for chrominance (Cr) 35.40 dB
Number of bits
Coefficients Y 4409333 bits
Cb 871913 bits
Cr 879860 bits
total 6161106 bits
Motion vectors 0 bits
Overhead 52126 bits
TOTAL 6213232 bits
Mean value of Q scale 6.75

B-picture : 198 pictures
SNR for luminance 28.40 dB
SNR for chrominance (Cb) 33.74 dB
SNR for chrominance (Cr) 34.17 dB
Number of bits
Coefficients Y 1414337 bits
Cb 101287 bits
Cr 48067 bits
total 1563691 bits
Motion vectors 1806278 bits
Overhead 1106511 bits
TOTAL 4476480 bits
Mean value of Q scale 18.97

P0-picture : 13 pictures
SNR for luminance 30.62 dB
SNR for chrominance (Cb) 33.80 dB
SNR for chrominance (Cr) 34.52 dB
Number of bits
Coefficients Y 2353294 bits
Cb 156723 bits
Cr 168438 bits
total 2678455 bits
Motion vectors 86323 bits
Overhead 116406 bits
TOTAL 2881184 bits
Mean value of Q scale 6.82

P1-picture : 38 pictures
SNR for luminance 29.32 dB
SNR for chrominance (Cb) 33.83 dB
SNR for chrominance (Cr) 34.29 dB
Number of bits
Coefficients Y 2238814 bits
Cb 247626 bits
Cr 187975 bits
total 2674415 bits
Motion vectors 408649 bits
Overhead 299008 bits
TOTAL 3382072 bits
Mean value of Q scale 9.70

P2-picture : 38 pictures
SNR for luminance 29.09 dB
SNR for chrominance (Cb) 33.44 dB
SNR for chrominance (Cr) 33.96 dB
Number of bits
Coefficients Y 1940483 bits
Cb 171189 bits
Cr 144887 bits
total 2256559 bits
Motion vectors 379700 bits
Overhead 396493 bits
TOTAL 3032752 bits
Mean value of Q scale 9.72

Mobile and Calender : 4.0000 Mbits/sec : Statistics of each field and frame

				field statistics				frame statistics				cumulative
COD	INP	T	Qsc	SN-Y	SN-Cb	SN-Cr	bits	SN-Y	SN-Cb	SN-Cr	bits	bit count
0	0	I	7.4	31.45	34.72	35.38	445720					445880
1	1	P0	7.0	30.53	34.01	34.81	213480	30.96	34.35	35.09	659200	659360
2	6	P1	9.0	29.51	34.03	34.71	106944					766304
3	7	P2	9.8	28.98	33.95	34.66	81376	29.24	33.99	34.68	188320	847680
4	2	B	19.0	27.93	34.17	34.80	26000					873680
5	3	B	18.0	28.61	34.00	34.73	25128	28.26	34.08	34.77	51128	898808
6	4	B	18.0	28.44	33.98	34.65	25200					924008
7	5	B	19.0	27.79	34.00	34.64	25984	28.11	33.99	34.65	51184	949992
8	12	P1	10.4	28.67	33.80	34.29	94704					1044696
9	13	P2	10.2	28.63	33.74	34.30	91536	28.65	33.77	34.30	186240	1136232
10	8	B	20.0	27.62	33.69	34.29	25672					1161904
11	9	B	19.0	27.79	33.66	34.28	25704	27.71	33.68	34.29	51376	1187608
12	10	B	19.0	27.86	33.70	34.25	24904					1212512
13	11	B	20.0	27.41	33.64	34.12	25896	27.63	33.67	34.18	50800	1238408
14	18	P1	10.9	28.36	33.49	33.92	92816					1331224
15	19	P2	10.8	28.37	33.55	34.02	80088	28.37	33.52	33.97	172904	1411312
16	14	B	21.7	26.86	33.33	33.81	26416					1437728
17	15	B	21.0	27.33	33.37	33.79	24536	27.09	33.35	33.80	50952	1462264
18	16	B	21.7	27.41	33.34	33.79	24624					1486888
19	17	B	23.0	27.06	33.41	33.80	22712	27.23	33.38	33.80	47336	1509600
20	24	I	7.0	31.57	34.87	35.50	459176					1968840
21	25	P0	7.0	30.42	33.94	34.76	209576	30.96	34.38	35.11	668752	2178416
22	20	B	21.0	27.89	34.24	34.67	23368					2201784
23	21	B	21.0	28.11	33.77	34.37	22080	28.00	34.00	34.52	45448	2223864
24	22	B	21.0	28.49	34.36	34.82	20992					20992
25	23	B	21.0	27.86	33.87	34.65	23688	28.16	34.11	34.74	44680	44680
26	30	P1	8.1	30.16	34.50	35.12	97800					142480
27	31	P2	9.1	29.29	33.83	34.55	86176	29.70	34.15	34.83	183976	228656
28	26	B	16.0	28.62	34.44	35.04	27024					255680
29	27	B	16.7	28.54	33.78	34.42	26928	28.58	34.10	34.72	53952	282608
30	28	B	16.7	28.64	34.18	34.85	24624					307232
31	29	B	16.7	28.25	33.70	34.40	24752	28.44	33.93	34.62	49376	331984
32	36	P1	9.1	29.46	33.95	34.53	88544					420528
33	37	P2	8.9	29.29	33.71	34.35	96504	29.37	33.83	34.44	185048	517032
34	32	B	17.0	28.69	33.82	34.46	19416					536448
35	33	B	17.0	28.25	33.49	34.14	22760	28.46	33.65	34.29	42176	559208
36	34	B	17.0	28.54	33.95	34.60	22864					582072
37	35	B	17.0	28.86	33.65	34.33	20480	28.70	33.80	34.46	43344	602552
38	42	P1	9.4	29.18	33.71	34.19	94440					696992
39	43	P2	9.3	29.05	33.39	34.01	93104	29.11	33.55	34.10	187544	790096
40	38	B	17.0	28.21	33.49	34.05	23936					814032
41	39	B	17.0	28.10	33.28	33.88	24352	28.15	33.39	33.97	48288	838384
42	40	B	17.0	28.27	33.67	34.21	24984					863368
43	41	B	17.7	28.33	33.42	34.10	21192	28.30	33.54	34.16	46176	884560
44	48	I	5.4	32.73	35.54	36.20	517592					1402216
45	49	P0	6.3	31.01	34.38	35.15	247984	31.78	34.92	35.65	765576	1650200
46	44	B	17.0	29.76	34.87	35.28	20632					1670832
47	45	B	17.7	28.93	34.02	34.62	23360	29.33	34.42	34.94	43992	1694192
48	46	B	17.0	29.39	34.88	35.35	22592					22592
49	47	B	17.0	29.12	34.20	34.89	20936	29.25	34.53	35.11	43528	43528
50	54	P1	8.6	30.15	34.41	34.97	91640					135168
51	55	P2	9.3	29.44	33.89	34.43	83944	29.78	34.14	34.69	175584	219112
52	50	B	17.0	29.90	34.73	35.23	18392					237504
53	51	B	17.0	29.33	33.83	34.44	22536	29.60	34.26	34.82	40928	260040
54	52	B	17.0	29.75	34.99	35.45	20768					280808
55	53	B	17.0	29.07	34.09	34.76	21144	29.40	34.51	35.09	41912	301952
56	60	P1	9.6	29.31	33.81	34.26	88320					390272
57	61	P2	9.5	29.06	33.53	34.00	83968	29.19	33.67	34.13	172288	474240
58	56	B	19.0	28.65	33.90	34.31	18888					493128
59	57	B	19.0	28.32	33.45	33.90	21184	28.49	33.67	34.10	40072	514312
60	58	B	19.0	28.97	34.51	34.87	18248					532560
61	59	B	19.0	28.65	33.83	34.39	17064	28.81	34.16	34.62	35312	549624
62	66	P1	8.3	29.75	33.89	34.41	95576					645200
63	67	P2	9.0	29.29	33.59	34.17	79456	29.52	33.74	34.29	175032	724656
64	62	B	18.0	27.66	34.00	34.29	22688					747344
65	63	B	18.0	27.60	33.69	34.11	23568	27.63	33.84	34.20	46256	770912
66	64	B	18.0	27.73	34.11	34.49	22024					792936
67	65	B	18.0	27.56	33.61	34.24	20872	27.64	33.85	34.36	42896	813808
68	72	I	7.2	31.44	34.81	35.38	465848					1279720
69	73	P0	7.0	30.44	33.70	34.47	221064	30.91	34.22	34.90	686912	1500784
70	68	B	16.3	28.70	34.48	34.90	24440					1525224
71	69	B	17.0	28.18	34.05	34.65	26656	28.43	34.26	34.77	51096	1551880
72	70	B	16.0	28.85	34.81	35.23	25008					25008
73	71	B	17.0	28.30	33.95	34.65	22408	28.57	34.36	34.93	47416	47416
74	78	P1	8.2	30.12	34.39	34.91	91096					138512
75	79	P2	8.1	29.93	33.74	34.45	84056	30.02	34.05	34.68	175152	222568
76	74	B	15.0	28.80	34.40	34.88	25456					248024
77	75	B	16.0	28.37	33.66	34.24	26912	28.58	34.02	34.55	52368	274936
78	76	B	16.0	28.53	34.31	34.78	27328					302264
79	77	B	16.0	28.29	33.74	34.41	26128	28.41	34.02	34.59	53456	328392
80	84	P1	10.2	29.08	33.84	34.26	86096					414488
81	85	P2	9.5	29.20	33.29	33.84	80704	29.14	33.56	34.05	166800	495192
82	80	B	19.0	28.66	33.93	34.35	21464					516656
83	81	B	19.0	28.47	33.24	33.72	23264	28.56	33.57	34.02	44728	539920
84	82	B	19.0	28.71	34.15	34.62	23264					563184
85	83	B	19.0	28.56	33.56	34.15	21000	28.64	33.84	34.38	44264	584184
86	90	P1	10.4	28.85	33.49	33.88	92168					676352
87	91	P2	10.2	28.75	33.13	33.69	82072	28.80	33.31	33.78	174240	758424
88	86	B	20.0	27.72	33.47	33.77	23616					782040
89	87	B	20.0	27.74	32.99	33.38	23848	27.73	33.22	33.57	47464	805888
90	88	B	21.0	27.64	33.73	34.01	22280					828168
91	89	B	21.0	27.75	33.38	33.81	20544	27.69	33.55	33.91	42824	848712
92	96	I	7.0	31.56	34.77	35.34	466096					1314872
93	97	P0	7.0	30.48	33.73	34.39	220224	30.99	34.22	34.84	686320	1535096
94	92	B	19.0	28.47	34.17	34.52	23208					1558304
95	93	B	19.0	28.27	33.73	34.16	25456	28.37	33.95	34.34	48664	1583760
96	94	B	19.0	28.74	34.58	34.92	22624					22624
97	95	B	19.0	28.26	33.90	34.42	21440	28.49	34.23	34.67	44064	44064
98	102	P1	8.9	29.79	34.15	34.53	90504					134568
99	103	P2	9.3	29.19	33.42	34.02	81528	29.48	33.77	34.27	172032	216096
100	98	B	17.0	29.05	34.35	34.72	20864					236960
101	99	B	17.0	28.81	33.48	33.93	21968	28.93	33.89	34.31	42832	258928
102	100	B	17.0	29.07	34.36	34.70	22568					281496
103	101	B	17.0	28.64	33.74	34.26	21528	28.85	34.04	34.48	44096	303024
104	108	P1	9.5	29.34	33.67	34.11	100512					403536
105	109	P2	9.3	29.06	33.38	33.90	92256	29.20	33.52	34.00	192768	495792
106	104	B	18.0	28.12	33.71	34.05	25040					520832
107	105	B	17.0	28.37	33.34	33.79	25952	28.25	33.52	33.92	50992	546784
108	106	B	17.0	28.63	33.97	34.26	24992					571776
109	107	B	18.0	27.86	33.48	33.99	25984	28.22	33.72	34.12	50976	597760
110	114	P1	9.6	29.00	33.43	33.88	96056					693816
111	115	P2	10.6	28.44	33.31	33.75	81624	28.71	33.37	33.81	177680	775440
112	110	B	20.7	27.67	33.35	33.63	21688					797128
113	111	B	20.7	27.72	33.13	33.50	22544	27.70	33.24	33.57	44232	819672
114	112	B	22.0	27.81	33.40	33.65	21664					841336
115	113	B	22.0	27.31	33.23	33.65	22928	27.55	33.32	33.65	44592	864264
116	120	I	7.0	31.53	34.76	35.27	470048					1334376
117	121	P0	7.0	30.47	33.67	34.41	223208	30.97	34.18	34.82	693256	1557584
118	116	B	20.0	28.44	34.14	34.48	23096					1580680
119	117	B	20.0	28.01	33.70	34.17	24192	28.22	33.91	34.32	47288	1604872
120	118	B	20.0	28.54	34.37	34.70	22360					22360
121	119	B	20.0	28.23	33.75	34.38	21736	28.38	34.05	34.54	44096	44096
122	126	P1	9.0	29.47	33.97	34.50	96632					140728
123	127	P2	8.4	29.72	33.85	34.47	90704	29.59	33.91	34.49	187336	231432
124	122	B	16.7	28.74	34.22	34.68	26576					258008
125	123	B	17.0	28.28	33.48	33.97	28600	28.50	33.84	34.31	55176	286608
126	124	B	17.0	28.50	34.06	34.43	27576					314184
127	125	B	17.0	28.39	33.70	34.29	26232	28.44	33.88	34.36	53808	340416

128	132	P1	10.8	28.48	33.50	33.98	89024					429440
129	133	P2	10.2	28.70	33.61	34.00	77224	28.59	33.56	33.99	166248	506664
130	128	B	20.0	27.85	33.50	33.98	23288					529952
131	129	B	20.0	27.86	33.54	33.99	24832	27.85	33.52	33.99	48120	554784
132	130	B	20.7	27.54	33.47	33.90	24696					579480
133	131	B	20.0	27.76	33.60	34.00	22520	27.65	33.53	33.95	47216	602000
134	138	P1	11.5	28.04	33.22	33.58	84040					686040
135	139	P2	11.1	28.20	33.26	33.71	74800	28.12	33.24	33.64	158840	760840
136	134	B	22.7	27.19	33.10	33.46	22736					783576
137	135	B	22.7	27.20	33.13	33.48	22440	27.20	33.12	33.47	45176	806016
138	136	B	23.0	27.05	33.20	33.47	22792					828808
139	137	B	23.3	27.09	33.15	33.50	21088	27.07	33.17	33.48	43880	849896
140	144	I	7.0	31.48	34.66	35.24	472976					1322936
141	145	P0	7.0	30.35	33.64	34.32	218584	30.88	34.12	34.75	691560	1541520
142	140	B	22.0	28.03	33.92	34.26	21888					1563408
143	141	B	22.0	27.85	33.65	34.09	22928	27.94	33.78	34.17	44816	1586336
144	142	B	22.0	28.37	34.21	34.55	20144					20144
145	143	B	22.0	27.80	33.64	34.23	22192	28.08	33.92	34.39	42336	42336
146	150	P1	10.2	28.93	33.66	34.10	98040					140376
147	151	P2	9.6	29.11	33.72	34.12	87728	29.02	33.69	34.11	185768	228104
148	146	B	19.7	28.02	34.08	34.41	25800					253904
149	147	B	19.0	28.18	33.59	34.02	26912	28.10	33.83	34.21	52712	280816
150	148	B	19.0	28.19	33.78	34.18	26792					307608
151	149	B	19.0	27.91	33.59	34.12	26520	28.05	33.68	34.15	53312	334128
152	156	P1	10.4	28.67	33.38	33.88	96312					430440
153	157	P2	10.3	28.71	33.44	33.88	79280	28.69	33.41	33.88	175592	509720
154	152	B	19.7	27.19	33.28	33.59	28616					538336
155	153	B	19.0	27.80	33.42	33.73	27024	27.48	33.35	33.66	55640	565360
156	154	B	19.0	27.60	33.23	33.62	26832					592192
157	155	B	19.0	27.62	33.38	33.77	26032	27.61	33.31	33.70	52864	618224
158	162	P1	10.9	28.28	33.07	33.53	89656					707880
159	163	P2	11.6	28.01	33.01	33.36	67608	28.15	33.04	33.44	157264	775488
160	158	B	22.0	27.22	33.09	33.51	22744					798232
161	159	B	22.0	27.56	33.09	33.47	21568	27.39	33.09	33.49	44312	819800
162	160	B	22.0	27.53	32.90	33.30	19928					839728
163	161	B	22.0	27.16	32.93	33.27	20880	27.34	32.91	33.29	40808	860608
164	168	I	7.0	31.49	34.70	35.24	473568					1334240
165	169	P0	7.0	30.42	33.58	34.24	216944	30.92	34.10	34.71	690512	1551184
166	164	B	22.0	28.18	34.07	34.32	18032					1569216
167	165	B	22.0	28.20	33.71	34.13	18760	28.19	33.88	34.23	36792	1587976
168	166	B	22.0	28.65	34.41	34.80	17568					17568
169	167	B	22.0	27.91	33.76	34.27	18472	28.26	34.07	34.53	36040	36040
170	174	P1	7.6	30.37	34.39	34.86	107472					143512
171	175	P2	8.1	29.77	33.64	34.25	92968	30.06	34.00	34.54	200440	236480
172	170	B	16.0	28.63	34.30	34.69	24072					260552
173	171	B	15.0	28.81	33.75	34.29	25408	28.72	34.02	34.49	49480	285960
174	172	B	15.0	29.22	34.11	34.48	23976					309936
175	173	B	16.3	28.27	33.31	33.84	25888	28.72	33.69	34.15	49864	335824
176	180	P1	9.1	29.47	33.91	34.35	99168					434992
177	181	P2	8.7	29.43	33.43	33.96	92040	29.45	33.66	34.15	191208	527032
178	176	B	17.7	28.39	34.02	34.39	25520					552552
179	177	B	17.0	28.62	33.52	34.04	26984	28.50	33.77	34.21	52504	579536
180	178	B	17.0	28.54	33.90	34.22	26240					605776
181	179	B	18.0	27.99	33.31	33.84	25336	28.26	33.59	34.02	51576	631112
182	186	P1	11.0	28.42	33.17	33.62	92128					723240
183	187	P2	11.2	28.33	32.85	33.29	72832	28.37	33.01	33.45	164960	796072
184	182	B	21.7	27.53	33.33	33.64	21968					818040
185	183	B	21.0	27.72	33.02	33.42	24104	27.62	33.17	33.53	46072	842144
186	184	B	22.3	27.56	33.19	33.44	21288					863432
187	185	B	23.0	27.16	32.76	33.13	21472	27.36	32.97	33.28	42760	884904
188	192	I	7.0	31.44	34.60	35.19	476144					1361112
189	193	P0	7.0	30.36	33.55	34.19	218384	30.87	34.05	34.66	694528	1579496
190	188	B	21.0	28.24	34.11	34.44	22752					1602248
191	189	B	21.0	28.43	33.59	34.06	21928	28.34	33.84	34.25	44680	1624176
192	190	B	21.0	28.94	34.31	34.64	20560					20560
193	191	B	21.0	28.60	33.60	34.12	19248	28.77	33.94	34.37	39808	39808

194	198	P1	7.9	30.08	34.38	34.84	99208					139016
195	199	P2	8.2	29.60	33.65	34.18	90032	29.83	34.00	34.50	189240	229048
196	194	B	15.0	29.52	34.46	34.92	24296					253344
197	195	B	15.0	29.26	33.63	34.14	25656	29.39	34.02	34.51	49952	279000
198	196	B	15.0	29.48	34.32	34.72	24632					303632
199	197	B	15.0	29.09	33.56	34.06	24272	29.28	33.92	34.38	48904	327904
200	204	P1	9.1	29.50	33.88	34.26	93128					421032
201	205	P2	9.2	29.25	33.39	33.82	85776	29.37	33.63	34.03	178904	506808
202	200	B	17.0	29.12	33.99	34.36	21600					528408
203	201	B	17.0	28.90	33.41	33.84	22760	29.01	33.69	34.09	44360	551168
204	202	B	17.0	28.94	33.83	34.19	22576					573744
205	203	B	17.0	28.75	33.29	33.70	20216	28.84	33.55	33.94	42792	593960
206	210	P1	9.3	29.41	33.59	34.05	95008					688968
207	211	P2	9.4	29.13	33.22	33.63	83776	29.27	33.40	33.84	178784	772744
208	206	B	17.0	28.95	33.53	33.82	20768					793512
209	207	B	17.0	28.66	33.15	33.52	23200	28.80	33.34	33.66	43968	816712
210	208	B	17.7	28.72	33.48	33.75	22328					839040
211	209	B	19.0	28.44	33.12	33.43	18776	28.58	33.30	33.59	41104	857816
212	216	I	5.4	32.72	35.34	35.85	528656					1386536
213	217	P0	6.1	31.10	33.99	34.66	245896	31.84	34.61	35.21	774552	1632432
214	212	B	17.0	29.26	34.64	34.76	22128					1654560
215	213	B	17.0	28.61	33.97	34.38	26064	28.93	34.29	34.56	48192	1680624
216	214	B	17.0	29.34	34.92	35.17	24552					24552
217	215	B	17.0	29.13	33.96	34.50	22560	29.23	34.41	34.82	47112	47112
218	222	P1	9.5	29.81	34.26	34.57	90432					137544
219	223	P2	9.5	29.41	33.49	33.93	80632	29.61	33.86	34.24	171064	218176
220	218	B	19.0	28.91	34.86	35.11	20576					238752
221	219	B	19.0	28.57	33.91	34.30	22504	28.73	34.36	34.69	43080	261256
222	220	B	19.0	28.80	34.40	34.56	20968					282224
223	221	B	19.0	28.36	33.42	33.76	20256	28.58	33.88	34.14	41224	302480
224	228	P1	10.4	29.15	34.10	34.42	86176					388656
225	229	P2	9.4	29.39	33.62	34.06	78280	29.27	33.85	34.24	164456	466936
226	224	B	18.7	28.09	33.89	34.07	23960					490896
227	225	B	18.7	28.13	33.46	33.75	24224	28.11	33.67	33.90	48184	515120
228	226	B	18.7	28.04	33.79	34.01	23408					538528
229	227	B	19.0	27.72	33.28	33.65	21920	27.88	33.53	33.82	45328	560448
230	234	P1	9.9	29.53	33.92	34.28	80016					640464
231	235	P2	10.1	29.21	33.30	33.70	64016	29.37	33.60	33.98	144032	704480
232	230	B	20.3	27.95	33.54	33.76	21768					726248
233	231	B	21.0	28.00	33.08	33.36	21400	27.97	33.30	33.55	43168	747648
234	232	B	21.0	27.85	33.73	33.91	21008					768656
235	233	B	21.0	27.66	33.20	33.51	20968	27.75	33.46	33.70	41976	789624
236	240	I	7.2	31.58	34.54	35.16	468320					1258008
237	241	P0	7.0	30.49	33.63	34.33	206016	31.00	34.06	34.73	674336	1464024
238	236	B	19.0	29.61	34.35	34.66	18584					1482608
239	237	B	19.0	28.87	33.52	33.89	22168	29.22	33.91	34.26	40752	1504776
240	238	B	19.0	29.53	34.39	34.80	18256					18256
241	239	B	19.0	29.11	33.74	34.26	17632	29.32	34.05	34.52	35888	35888
242	246	P1	7.4	30.63	34.39	34.92	99488					135376
243	247	P2	7.3	30.43	33.81	34.46	96800	30.53	34.09	34.69	196288	232176
244	242	B	14.0	29.23	34.09	34.49	28704					260880
245	243	B	14.0	28.90	33.40	33.94	30480	29.06	33.73	34.21	59184	291360
246	244	B	14.0	29.28	34.18	34.58	29576					320936
247	245	B	15.0	28.88	33.55	34.05	28032	29.08	33.85	34.31	57608	348968
248	252	P1	9.3	29.88	33.91	34.31	88296					437264
249	253	P2	9.1	29.70	33.42	33.92	82208	29.79	33.66	34.11	170504	519472
250	248	B	17.0	28.84	33.66	34.05	24832					544304
251	249	B	17.7	28.69	33.23	33.68	25912	28.76	33.44	33.86	50744	570216
252	250	B	17.0	29.06	33.62	33.93	25232					595448
253	251	B	17.0	28.85	33.16	33.55	24152	28.95	33.38	33.74	49384	619600
254	258	P1	8.0	30.59	34.04	34.55	93408					713008
255	259	P2	8.5	30.20	33.59	34.09	76664	30.39	33.81	34.31	170072	789672
256	254	B	16.0	29.32	33.79	34.24	24424					814096
257	255	B	16.3	29.25	33.39	33.86	23928	29.29	33.59	34.04	48352	838024
258	256	B	17.0	29.50	33.82	34.26	21840					859864
259	257	B	17.0	29.29	33.52	33.98	21272	29.39	33.67	34.12	43112	881136

260	264	I	6.8	32.10	34.81	35.39	468656					1349856
261	265	P0	7.0	30.78	33.86	34.60	193152	31.39	34.31	34.97	661808	1543008
262	260	B	13.8	30.56	34.95	35.36	25368					1568376
263	261	B	16.2	29.68	34.06	34.60	24216	30.10	34.48	34.96	49584	1592592
264	262	B	16.2	30.11	35.03	35.47	24600					24600
265	263	B	18.5	29.11	34.02	34.55	23248	29.58	34.49	34.99	47848	47848
266	270	P1	8.9	30.78	34.62	35.12	71864					119712
267	271	P2	9.3	29.89	33.60	34.19	59536	30.31	34.08	34.63	131400	179248
268	266	B	16.7	29.55	34.32	34.76	20808					200056
269	267	B	18.2	29.18	33.37	33.90	20776	29.36	33.82	34.31	41584	220832
270	268	B	17.8	29.70	34.08	34.56	20488					241320
271	269	B	18.2	29.23	33.52	34.15	19304	29.46	33.79	34.35	39792	260624
272	276	P1	9.5	30.22	34.11	34.53	71328					331952
273	277	P2	9.8	29.71	33.38	33.96	64336	29.96	33.73	34.23	135664	396288
274	272	B	18.0	29.52	33.88	34.20	19008					415296
275	273	B	20.3	28.84	33.23	33.74	19120	29.17	33.54	33.97	38128	434416
276	274	B	19.2	29.35	33.94	34.37	19296					453712
277	275	B	20.7	28.70	33.26	33.80	19120	29.01	33.59	34.08	38416	472832
278	282	P1	10.7	29.23	33.73	34.03	64912					537744
279	283	P2	11.4	28.63	33.10	33.64	63984	28.92	33.41	33.83	128896	601728
280	278	B	24.5	28.86	33.70	33.89	16184					617912
281	279	B	24.5	28.70	33.17	33.57	16720	28.78	33.43	33.73	32904	634632
282	280	B	24.5	28.62	33.59	33.76	16616					651248
283	281	B	24.5	28.44	33.14	33.55	15272	28.53	33.36	33.65	31888	666520
284	288	I	6.5	31.76	34.61	35.24	500432					1167016
285	289	P0	6.2	31.31	33.74	34.50	246672	31.53	34.15	34.85	747104	1413688
286	284	B	19.8	29.99	34.51	35.01	16864					1430552
287	285	B	20.7	29.62	33.55	34.13	16616	29.80	34.00	34.55	33480	1447168
288	286	B	19.8	29.74	34.30	34.66	16752					16752
289	287	B	21.7	29.04	33.60	34.05	15512	29.37	33.94	34.35	32264	32264
290	294	P1	12.8	29.09	33.61	33.99	47520					79784
291	295	P2	11.1	29.08	33.07	33.68	52600	29.09	33.33	33.83	100120	132384
292	290	B	23.7	29.06	33.90	34.34	14720					147104
293	291	B	25.7	28.84	33.10	33.59	15120	28.95	33.48	33.95	29840	162224
294	292	B	23.3	29.40	34.27	34.73	16040					178264
295	293	B	22.7	29.48	33.48	34.05	14168	29.44	33.85	34.38	30208	192432
296	298	P1	15.1	27.84	32.94	33.44	41600					234032
297	299	P2	14.8	27.56	32.28	32.75	40536	27.70	32.60	33.08	82136	274568
298	296	B	30.8	27.43	33.23	33.44	14432					289000
299	297	B	27.8	27.40	32.69	33.02	15432	27.41	32.95	33.22	29864	304432

Football : 4.0000 Mbits/sec : Results averaged over sequence

```
Total : 300 pictures
        SNR for luminance               31.83 dB
        SNR for chrominance (Cb)        36.23 dB
        SNR for chrominance (Cr)        37.16 dB
        Number of bits
             Coefficients     Y      10768880 bits
                              Cb       761599 bits
                              Cr      1290052 bits
                              total  12820531 bits
             Motion vectors           4711154 bits
             Overhead                 2431419 bits
             TOTAL                   19963104 bits
        Mean value of Q scale           13.31

I-picture : 13 pictures
        SNR for luminance               34.14 dB
        SNR for chrominance (Cb)        37.57 dB
        SNR for chrominance (Cr)        38.08 dB
        Number of bits
             Coefficients     Y       2413997 bits
                              Cb       301513 bits
                              Cr       412413 bits
                              total   3127923 bits
             Motion vectors                 0 bits
             Overhead                   52109 bits
             TOTAL                    3180032 bits
        Mean value of Q scale            7.27

B-picture : 198 pictures
        SNR for luminance               31.55 dB
        SNR for chrominance (Cb)        36.17 dB
        SNR for chrominance (Cr)        37.14 dB
        Number of bits
             Coefficients     Y       3503625 bits
                              Cb       136561 bits
                              Cr       312385 bits
                              total   3952571 bits
             Motion vectors           3538170 bits
             Overhead                 1598051 bits
             TOTAL                    9088792 bits
        Mean value of Q scale           15.27

P0-picture : 13 pictures
        SNR for luminance               33.19 dB
        SNR for chrominance (Cb)        37.16 dB
        SNR for chrominance (Cr)        37.89 dB
        Number of bits
             Coefficients     Y        870890 bits
                              Cb        49475 bits
                              Cr        79864 bits
                              total   1000229 bits
             Motion vectors             88600 bits
             Overhead                  112947 bits
             TOTAL                    1201776 bits
        Mean value of Q scale            7.23

P1-picture : 38 pictures
        SNR for luminance               32.05 dB
        SNR for chrominance (Cb)        36.03 dB
        SNR for chrominance (Cr)        36.93 dB
```

Number of bits

Coefficients	Y	2536506 bits
	Cb	109667 bits
	Cr	342919 bits
	total	3079092 bits
Motion vectors		555380 bits
Overhead		296904 bits
TOTAL		3931376 bits

Mean value of Q scale 10.49

P2-picture : 38 pictures

SNR for luminance		32.09 dB
SNR for chrominance (Cb)		36.07 dB
SNR for chrominance (Cr)		36.98 dB
Number of bits		
Coefficients	Y	1443862 bits
	Cb	74383 bits
	Cr	142471 bits
	total	1660716 bits
Motion vectors		529004 bits
Overhead		370448 bits
TOTAL		2560168 bits

Mean value of Q scale 10.12

Football : 4.0000 Mbits/sec : Statistics of each field and frame

				field statistics				frame statistics				cumulative
COD	INP	T	Qsc	SN-Y	SN-Cb	SN-Cr	bits	SN-Y	SN-Cb	SN-Cr	bits	bit count
0	0	I	4.2	36.50	40.38	40.69	230656					230816
1	1	P0	4.0	35.82	40.08	40.45	132152	36.15	40.23	40.57	362808	362968
2	6	P1	10.1	33.28	37.98	38.88	98656					461624
3	7	P2	7.9	33.46	38.07	38.88	82336	33.37	38.03	38.88	180992	543960
4	2	B	12.7	33.79	38.75	39.55	41696					585656
5	3	B	13.3	33.25	38.19	39.06	52336	33.52	38.46	39.30	94032	637992
6	4	B	13.3	33.00	37.90	38.86	51144					689136
7	5	B	13.3	32.67	37.94	38.84	43368	32.83	37.92	38.85	94512	732504
8	12	P1	11.5	32.80	37.31	38.23	90800					823304
9	13	P2	10.7	32.93	37.32	38.34	65912	32.86	37.32	38.28	156712	889216
10	8	B	16.3	31.85	37.22	38.36	39432					928648
11	9	B	17.3	31.82	36.88	37.99	49032	31.83	37.05	38.17	88464	977680
12	10	B	17.3	31.57	36.71	37.91	49760					1027440
13	11	B	16.3	31.89	36.97	38.06	42088	31.73	36.84	37.98	91848	1069528
14	18	P1	12.2	32.13	36.70	37.59	96360					1165888
15	19	P2	11.9	32.20	36.71	37.62	64032	32.17	36.70	37.60	160392	1229920
16	14	B	17.7	31.43	36.59	37.73	42928					1272848
17	15	B	18.3	31.31	36.17	37.32	50688	31.37	36.37	37.52	93616	1323536
18	16	B	18.0	31.46	36.22	37.21	52328					1375864
19	17	B	17.0	31.75	36.51	37.48	42248	31.60	36.36	37.35	94576	1418112
20	24	I	4.4	36.10	39.41	39.80	262432					1680608
21	25	P0	4.0	35.66	39.15	39.69	158208	35.88	39.28	39.74	420640	1838816
22	20	B	18.0	31.78	36.65	37.67	41504					1880320
23	21	B	19.0	31.58	36.52	37.59	53928	31.68	36.58	37.63	95432	1934248
24	22	B	19.0	31.94	36.77	37.92	53808					53808
25	23	B	17.3	32.30	37.64	38.84	38488	32.11	37.19	38.35	92296	92296
26	30	P1	15.6	31.87	36.28	37.71	87896					180192
27	31	P2	13.2	32.44	36.48	37.92	55744	32.14	36.38	37.81	143640	235936
28	26	B	20.0	31.74	37.30	38.39	38040					273976
29	27	B	22.0	31.22	36.35	37.67	50136	31.47	36.80	38.02	88176	324112
30	28	B	21.3	31.15	36.19	37.62	52040					376152
31	29	B	20.0	31.49	36.39	37.78	36912	31.31	36.29	37.70	88952	413064
32	36	P1	15.6	31.06	35.43	36.66	90688					503752
33	37	P2	15.8	30.99	35.44	36.85	49264	31.02	35.44	36.75	139952	553016
34	32	B	23.0	30.84	35.78	37.48	35792					588808
35	33	B	24.0	30.61	35.55	37.06	45424	30.72	35.67	37.26	81216	634232
36	34	B	24.0	30.27	35.26	36.81	46944					681176
37	35	B	23.0	30.58	35.47	36.83	34808	30.42	35.37	36.82	81752	715984
38	42	P1	11.7	31.77	35.99	36.97	108728					824712
39	43	P2	11.5	31.77	36.12	37.07	62480	31.77	36.06	37.02	171208	887192
40	38	B	17.7	30.78	35.60	37.00	42616					929808
41	39	B	18.3	30.76	35.50	36.94	53424	30.77	35.55	36.97	96040	983232
42	40	B	18.0	30.72	35.67	36.81	52816					1036048
43	41	B	17.0	31.02	35.78	36.96	40784	30.86	35.73	36.88	93600	1076832
44	48	I	4.8	35.85	38.69	39.19	272560					1349456
45	49	P0	5.0	34.88	38.23	38.98	127752	35.34	38.45	39.08	400312	1477208
46	44	B	18.0	31.51	36.31	37.38	41888					1519096
47	45	B	19.0	31.15	36.32	37.48	50040	31.32	36.32	37.42	91928	1569136
48	46	B	18.3	31.47	36.47	37.72	50872					50872
49	47	B	17.3	31.82	37.02	38.25	40960	31.64	36.74	37.98	91832	91832
50	54	P1	12.6	32.23	36.52	37.42	102056					193888
51	55	P2	13.1	31.73	36.17	37.26	60384	31.98	36.34	37.34	162440	254272
52	50	B	18.3	31.73	36.79	38.16	41504					295776
53	51	B	19.3	31.13	36.38	37.73	50320	31.42	36.58	37.94	91824	346096
54	52	B	19.3	31.08	36.22	37.54	49320					395416
55	53	B	18.3	31.17	36.37	37.50	40728	31.11	36.29	37.52	90048	436144
56	60	P1	11.4	32.17	36.47	37.36	96784					532928
57	61	P2	11.7	31.85	36.39	37.38	59272	32.01	36.43	37.37	156056	592200
58	56	B	17.0	31.15	36.08	37.15	44608					636808
59	57	B	17.3	31.04	36.03	37.09	52256	31.10	36.06	37.12	96864	689064
60	58	B	17.3	31.12	36.16	37.19	51096					740160
61	59	B	16.3	31.47	36.28	37.39	41904	31.29	36.22	37.29	93000	782064
62	66	P1	12.4	31.63	36.21	37.30	89864					871928
63	67	P2	12.1	31.77	36.25	37.38	58776	31.70	36.23	37.34	148640	930704
64	62	B	17.0	31.31	36.23	37.36	41264					971968
65	63	B	17.3	31.14	36.12	37.24	47256	31.23	36.17	37.30	88520	1019224
66	64	B	17.3	31.15	36.19	37.22	48808					1068032
67	65	B	17.0	31.24	36.34	37.33	40464	31.19	36.27	37.27	89272	1108496
68	72	I	5.7	35.16	38.37	38.77	256976					1365536
69	73	P0	6.0	34.14	38.05	38.63	97984	34.62	38.21	38.70	354960	1463520
70	68	B	17.7	31.76	36.70	37.80	39984					1503504
71	69	B	18.0	31.61	36.90	38.06	44360	31.68	36.80	37.93	84344	1547864
72	70	B	18.0	31.87	37.04	38.20	41592					41592
73	71	B	17.0	32.17	37.62	38.53	31528	32.02	37.32	38.36	73120	73120
74	78	P1	9.1	33.07	37.03	37.91	103824					176944
75	79	P2	9.4	32.57	36.89	37.75	67608	32.82	36.96	37.83	171432	244552
76	74	B	13.0	32.71	37.38	38.30	42448					287000
77	75	B	13.3	32.27	37.34	38.19	49168	32.49	37.36	38.25	91616	336168
78	76	B	13.3	32.49	37.17	38.08	48952					385120
79	77	B	13.0	32.16	37.13	38.03	43432	32.33	37.15	38.05	92384	428552
80	84	P1	9.9	32.50	36.66	37.56	99728					528280
81	85	P2	8.8	32.56	36.70	37.65	71752	32.53	36.68	37.61	171480	600032
82	80	B	14.0	31.65	36.63	37.66	46552					646584
83	81	B	14.3	31.85	36.74	37.69	50008	31.75	36.69	37.67	96560	696592
84	82	B	14.3	31.63	36.74	37.67	48776					745368
85	83	B	13.0	32.22	36.78	37.68	41912	31.91	36.76	37.68	90688	787280
86	90	P1	8.8	32.68	36.67	37.57	106680					893960
87	91	P2	8.7	32.72	36.65	37.50	72872	32.70	36.66	37.54	179552	966832
88	86	B	12.7	31.99	36.54	37.61	44320					1011152
89	87	B	13.0	32.05	36.58	37.64	51728	32.02	36.56	37.63	96048	1062880
90	88	B	13.0	31.85	36.57	37.61	52168					1115048
91	89	B	12.0	32.29	36.68	37.61	45368	32.07	36.62	37.61	97536	1160416
92	96	I	6.7	34.66	37.86	38.34	244576					1405056
93	97	P0	7.0	33.44	37.34	38.12	84816	33.98	37.59	38.23	329392	1489872
94	92	B	14.0	31.97	36.66	37.60	48736					1538608
95	93	B	14.0	31.91	36.82	37.72	57008	31.94	36.74	37.66	105744	1595616
96	94	B	14.0	31.90	36.87	37.78	54384					54384
97	95	B	13.0	32.28	37.16	38.09	44400	32.09	37.02	37.93	98784	98784
98	102	P1	11.8	31.83	36.24	37.21	88904					187688
99	103	P2	11.0	31.94	36.42	37.33	61528	31.88	36.33	37.27	150432	249216
100	98	B	16.7	31.28	36.62	37.69	40976					290192
101	99	B	17.3	31.55	36.36	37.46	47400	31.41	36.49	37.57	88376	337592
102	100	B	17.0	31.23	36.26	37.40	47344					384936
103	101	B	16.0	31.69	36.34	37.33	38288	31.45	36.30	37.36	85632	423224
104	108	P1	10.5	32.02	36.22	37.12	99568					522792
105	109	P2	10.2	32.18	36.37	37.27	61848	32.10	36.30	37.19	161416	584640
106	104	B	15.0	31.21	36.21	37.15	44192					628832
107	105	B	15.3	31.43	36.15	37.14	50064	31.31	36.18	37.14	94256	678896
108	106	B	15.0	31.30	36.13	37.07	49232					728128
109	107	B	14.0	31.53	36.20	37.20	41832	31.41	36.16	37.13	91064	769960
110	114	P1	9.1	32.29	36.29	37.22	107152					877112
111	115	P2	8.5	32.52	36.43	37.27	72112	32.40	36.36	37.24	179264	949224
112	110	B	12.0	31.87	36.36	37.34	55224					1004448
113	111	B	13.0	31.98	36.32	37.32	56992	31.93	36.34	37.33	112216	1061440
114	112	B	12.3	31.83	36.33	37.26	60304					1121744
115	113	B	11.0	32.18	36.35	37.34	49496	32.00	36.34	37.30	109800	1171240
116	120	I	8.1	33.76	37.40	38.00	232704					1404008
117	121	P0	8.0	32.79	37.03	37.87	77496	33.25	37.22	37.93	310200	1481504
118	116	B	12.3	32.22	36.73	37.58	47128					1528632
119	117	B	13.0	32.23	36.87	37.79	51528	32.23	36.79	37.68	98656	1580160
120	118	B	13.0	32.48	36.92	37.87	49576					49576
121	119	B	12.0	32.55	37.05	38.07	43336	32.52	36.99	37.97	92912	92912
122	126	P1	8.5	32.62	36.70	37.40	102720					195632
123	127	P2	9.7	32.11	36.48	37.31	64928	32.36	36.59	37.36	167648	260560
124	122	B	13.7	31.86	36.84	37.75	39272					299832
125	123	B	14.0	32.09	36.70	37.64	44304	31.98	36.77	37.69	83576	344136
126	124	B	14.0	31.75	36.71	37.63	44992					389128
127	125	B	13.7	31.92	36.71	37.50	36120	31.84	36.71	37.56	81112	425248
128	132	P1	7.6	33.00	36.85	37.49	116392					541640
129	133	P2	7.4	33.04	36.83	37.54	77936	33.02	36.84	37.51	194328	619576
130	128	B	12.0	32.05	36.50	37.32	48624					668200
131	129	B	12.0	32.14	36.54	37.38	54968	32.10	36.52	37.35	103592	723168
132	130	B	12.0	32.16	36.63	37.46	54104					777272
133	131	B	11.3	32.48	36.80	37.54	45760	32.32	36.71	37.50	99864	823032
134	138	P1	8.7	32.58	36.59	37.48	104672					927704
135	139	P2	7.8	32.89	36.75	37.56	71584	32.73	36.67	37.52	176256	999288
136	134	B	12.0	32.20	36.50	37.30	46048					1045336
137	135	B	12.3	32.08	36.53	37.35	51368	32.14	36.52	37.33	97416	1096704
138	136	B	12.0	32.06	36.55	37.40	51776					1148480
139	137	B	11.0	32.30	36.61	37.49	45000	32.18	36.58	37.45	96776	1193480
140	144	I	8.0	33.80	37.50	38.04	231184					1424728
141	145	P0	8.0	32.81	37.08	37.94	70720	33.27	37.28	37.99	301904	1495448
142	140	B	12.0	32.22	36.90	37.77	46576					1542024
143	141	B	13.0	32.34	36.97	37.89	47448	32.28	36.94	37.83	94024	1589472
144	142	B	13.0	32.35	36.99	37.96	46160					46160
145	143	B	12.0	32.46	37.24	38.12	42344	32.40	37.11	38.04	88504	88504
146	150	P1	8.7	32.62	36.54	37.55	114488					202992
147	151	P2	8.5	32.64	36.56	37.62	68952	32.63	36.55	37.59	183440	271944
148	146	B	13.0	32.14	36.78	37.97	39984					311928
149	147	B	14.0	32.20	36.68	37.85	44848	32.17	36.73	37.91	84832	356776
150	148	B	13.7	32.22	36.60	37.79	43520					400296
151	149	B	12.7	32.11	36.66	37.77	39640	32.17	36.63	37.78	83160	439936
152	156	P1	8.2	32.76	36.32	37.39	116064					556000
153	157	P2	7.8	32.86	36.39	37.49	84664	32.81	36.35	37.44	200728	640664
154	152	B	13.0	32.07	36.50	37.57	42808					683472
155	153	B	13.0	32.17	36.49	37.58	49880	32.12	36.49	37.58	92688	733352
156	154	B	13.0	32.12	36.38	37.47	48400					781752
157	155	B	12.3	32.15	36.48	37.47	44328	32.14	36.43	37.47	92728	826080
158	162	P1	8.7	32.49	36.06	37.15	116224					942304
159	163	P2	8.8	32.55	35.99	37.10	70168	32.52	36.02	37.12	186392	1012472
160	158	B	13.0	31.87	36.08	37.29	44056					1056528
161	159	B	13.3	31.99	36.11	37.29	50800	31.93	36.10	37.29	94856	1107328
162	160	B	13.0	31.91	36.07	37.23	51128					1158456
163	161	B	12.0	31.90	36.07	37.22	47784	31.91	36.07	37.23	98912	1206240
164	168	I	7.3	34.17	37.44	38.08	252112					1458416
165	169	P0	7.0	33.15	36.94	37.90	90728	33.63	37.18	37.99	342840	1549144
166	164	B	14.0	31.99	36.20	37.38	45576					1594720
167	165	B	14.0	31.76	36.34	37.53	53680	31.87	36.27	37.45	99256	1648400
168	166	B	14.0	31.75	36.45	37.63	53496					53496
169	167	B	13.3	32.36	36.78	37.82	42520	32.04	36.60	37.72	96016	96016
170	174	P1	10.9	31.71	35.84	37.05	102144					198160
171	175	P2	10.0	32.03	36.01	37.08	66312	31.87	35.93	37.06	168456	264472
172	170	B	15.0	31.66	36.42	37.62	41656					306128
173	171	B	16.0	31.54	36.25	37.48	47112	31.60	36.33	37.55	88768	353240
174	172	B	16.0	31.63	36.14	37.45	46936					400176
175	173	B	15.0	31.53	36.09	37.33	40424	31.58	36.11	37.39	87360	440600
176	180	P1	10.9	31.62	35.85	36.75	101664					542264
177	181	P2	9.9	31.91	36.00	37.01	63928	31.76	35.93	36.88	165592	606192
178	176	B	15.0	31.22	35.84	36.99	43648					649840
179	177	B	16.0	31.23	35.87	36.98	47344	31.22	35.85	36.99	90992	697184
180	178	B	15.3	31.24	35.99	36.93	47776					744960
181	179	B	14.7	31.27	35.92	36.96	39760	31.26	35.95	36.95	87536	784720
182	186	P1	9.9	32.03	35.98	37.03	105472					890192
183	187	P2	8.8	32.35	36.13	37.10	65312	32.19	36.05	37.07	170784	955504
184	182	B	13.7	31.37	35.93	37.06	43840					999344
185	183	B	14.0	31.38	35.99	37.18	49784	31.38	35.96	37.12	93624	1049128
186	184	B	13.7	31.52	36.03	37.17	47816					1096944
187	185	B	13.0	31.66	36.13	37.22	40824	31.59	36.08	37.20	88640	1137768
188	192	I	8.4	33.67	37.21	37.67	233944					1371776
189	193	P0	8.0	32.89	36.93	37.60	71648	33.26	37.07	37.63	305592	1443424
190	188	B	14.0	32.09	36.54	37.46	42040					1485464
191	189	B	14.3	31.91	36.67	37.62	47056	32.00	36.60	37.54	89096	1532520
192	190	B	14.3	31.78	36.81	37.70	48896					48896
193	191	B	13.7	32.10	36.95	37.79	42280	31.94	36.88	37.74	91176	91176

194	198	P1	9.1	32.24	36.38	36.96	115816					206992
195	199	P2	9.3	32.17	36.36	36.91	68536	32.21	36.37	36.94	184352	275528
196	194	B	13.0	32.09	36.71	37.57	45520					321048
197	195	B	14.0	31.79	36.47	37.37	50944	31.84	36.59	37.47	96464	371992
198	196	B	14.0	31.70	36.44	37.27	50248					422240
199	197	B	13.0	31.68	36.44	37.14	43440	31.69	36.44	37.20	93688	465680
200	204	P1	9.0	32.17	36.14	36.70	109440					575120
201	205	P2	8.8	32.22	36.24	36.78	71696	32.20	36.19	36.74	181136	646816
202	200	B	13.7	31.57	36.26	36.75	44720					691536
203	201	B	14.0	31.71	36.21	36.76	48808	31.64	36.23	36.75	93528	740344
204	202	B	14.0	31.63	36.30	36.76	46920					787264
205	203	B	13.0	31.81	36.30	36.88	39320	31.72	36.30	36.82	86240	826584
206	210	P1	8.4	32.61	36.20	36.67	118680					945264
207	211	P2	8.2	32.61	36.32	36.80	78664	32.61	36.26	36.74	197344	1023928
208	206	B	12.3	31.87	36.16	36.70	50128					1074056
209	207	B	13.0	31.84	36.21	36.69	51664	31.86	36.19	36.69	101792	1125720
210	208	B	12.0	31.97	36.28	36.75	51904					1177624
211	209	B	11.0	32.14	36.27	36.76	45056	32.05	36.27	36.76	96960	1222680
212	216	I	8.2	33.60	37.07	37.52	246064					1468808
213	217	P0	8.0	32.72	36.84	37.37	76848	33.14	36.95	37.44	322912	1545656
214	212	B	13.0	32.06	36.40	37.02	45720					1591376
215	213	B	13.0	32.00	36.58	37.23	51584	32.03	36.49	37.12	97304	1642960
216	214	B	13.0	32.18	36.64	37.30	49752					49752
217	215	B	12.3	32.23	36.82	37.54	43232	32.21	36.73	37.42	92984	92984
218	222	P1	9.1	32.26	35.96	36.80	114136					207120
219	223	P2	9.3	32.06	35.86	36.76	72800	32.15	35.91	36.78	186936	279920
220	218	B	14.0	31.95	36.38	37.19	42888					322808
221	219	B	14.0	31.66	36.24	37.01	50080	31.81	36.31	37.10	92968	372888
222	220	B	14.0	31.69	36.08	36.91	51328					424216
223	221	B	14.0	31.59	35.98	36.88	42536	31.64	36.03	36.90	93864	466752
224	228	P1	9.7	31.83	35.47	36.34	104712					571464
225	229	P2	8.9	32.15	35.63	36.46	70464	31.99	35.55	36.40	175176	641928
226	224	B	15.0	31.38	35.68	36.59	43704					685632
227	225	B	15.0	31.33	35.68	36.46	47240	31.35	35.68	36.53	90944	732872
228	226	B	15.0	31.29	35.56	36.37	48368					781240
229	227	B	14.0	31.31	35.59	36.38	40376	31.30	35.57	36.37	88744	821616
230	234	P1	9.4	31.91	35.32	36.08	108696					930312
231	235	P2	9.4	31.95	35.47	36.24	69296	31.93	35.40	36.16	177992	999608
232	230	B	13.0	31.52	35.48	36.32	44784					1044392
233	231	B	14.0	31.37	35.48	36.22	50704	31.44	35.48	36.27	95488	1095096
234	232	B	14.0	31.39	35.41	36.07	50672					1145768
235	233	B	13.0	31.39	35.44	36.14	43928	31.39	35.42	36.11	94600	1189696
236	240	I	7.8	33.83	37.11	37.53	255224					1444984
237	241	P0	8.0	32.84	36.55	37.22	89176	33.30	36.82	37.38	344400	1534160
238	236	B	14.0	31.66	35.88	36.61	46832					1580992
239	237	B	14.0	31.72	36.11	36.82	53432	31.69	35.99	36.72	100264	1634424
240	238	B	14.0	31.80	36.21	36.89	52392					52392
241	239	B	13.3	32.09	36.39	37.06	43824	31.94	36.30	36.97	96216	96216
242	246	P1	14.0	31.00	35.15	36.08	96072					192288
243	247	P2	13.5	30.77	34.98	35.81	61328	30.89	35.06	35.94	157400	253616
244	242	B	20.0	30.87	35.75	36.77	36432					290048
245	243	B	21.0	30.50	35.48	36.56	42304	30.68	35.61	36.66	78736	332352
246	244	B	21.0	30.39	35.33	36.35	43960					376312
247	245	B	20.0	30.32	35.25	36.19	38056	30.35	35.29	36.27	82016	414368
248	252	P1	13.7	30.64	34.72	35.61	100944					515312
249	253	P2	12.2	30.95	34.87	35.75	69824	30.79	34.79	35.68	170768	585136
250	248	B	19.3	29.99	34.61	35.60	46176					631312
251	249	B	20.0	29.95	34.72	35.58	51872	29.97	34.66	35.59	98048	683184
252	250	B	20.0	29.99	34.63	35.61	50808					733992
253	251	B	19.0	30.13	34.77	35.68	41272	30.06	34.70	35.65	92080	775264
254	258	P1	12.6	30.66	34.57	35.55	101784					877048
255	259	P2	11.8	30.85	34.72	35.62	67752	30.76	34.65	35.59	169536	944800
256	254	B	17.7	30.28	34.66	35.55	45728					990528
257	255	B	18.3	30.11	34.56	35.48	55848	30.20	34.61	35.52	101576	1046376
258	256	B	18.0	30.07	34.46	35.46	54104					1100480
259	257	B	17.0	30.18	34.59	35.59	44536	30.12	34.53	35.52	98640	1145016
260	264	I	11.6	32.12	35.92	36.59	215296					1360376
261	265	P0	12.0	30.98	35.39	36.22	55072	31.51	35.65	36.40	270368	1415448
262	260	B	19.0	30.24	34.95	35.83	42064					1457512
263	261	B	20.5	30.22	35.06	35.88	46096	30.23	35.00	35.85	88160	1503608
264	262	B	20.0	30.42	35.18	36.12	44656					44656
265	263	B	16.3	30.77	35.51	36.43	39184	30.59	35.34	36.27	83840	83840
266	270	P1	10.1	31.72	35.30	36.24	105016					188856
267	271	P2	9.5	31.96	35.36	36.37	64576	31.84	35.33	36.30	169592	253432
268	266	B	16.5	30.73	35.33	36.22	45072					298504
269	267	B	16.5	30.76	35.35	36.17	49056	30.75	35.34	36.20	94128	347560
270	268	B	16.5	30.88	35.31	36.24	47632					395192
271	269	B	13.8	31.37	35.44	36.37	40240	31.12	35.38	36.31	87872	435432
272	276	P1	10.2	32.00	35.33	36.25	100976					536408
273	277	P2	10.4	32.21	35.52	36.45	67240	32.10	35.43	36.35	168216	603648
274	272	B	14.5	31.31	35.27	36.34	41960					645608
275	273	B	16.5	31.05	35.34	36.36	44936	31.18	35.31	36.35	86896	690544
276	274	B	15.0	31.56	35.36	36.38	43768					734312
277	275	B	12.7	31.85	35.59	36.48	42208	31.70	35.48	36.43	85976	776520
278	282	P1	9.1	32.06	35.27	36.00	115944					892464
279	283	P2	9.2	32.02	35.24	36.05	65872	32.04	35.26	36.03	181816	958336
280	278	B	12.8	31.94	35.50	36.41	44912					1003248
281	279	B	13.5	31.86	35.52	36.37	47416	31.90	35.51	36.39	92328	1050664
282	280	B	12.5	31.76	35.41	36.24	49816					1100480
283	281	B	10.7	32.11	35.46	36.22	46832	31.93	35.43	36.23	96648	1147312
284	288	I	9.3	32.92	36.09	36.64	246304					1393680
285	289	P0	9.0	31.98	35.63	36.42	69176	32.42	35.85	36.53	315480	1462856
286	284	B	15.5	31.16	35.45	36.44	41776					1504632
287	285	B	15.5	31.14	35.55	36.42	45824	31.15	35.50	36.43	87600	1550456
288	286	B	15.5	31.44	35.59	36.47	45480					45480
289	287	B	15.0	31.32	35.69	36.55	39984	31.38	35.64	36.51	85464	85464
290	294	P1	10.7	31.64	35.36	36.13	92888					178352
291	295	P2	11.0	31.53	35.32	36.08	61632	31.58	35.34	36.10	154520	239984
292	290	B	16.7	31.20	35.47	36.33	35328					275312
293	291	B	18.5	31.01	35.39	36.24	37968	31.10	35.43	36.29	73296	313280
294	292	B	18.5	30.89	35.37	36.14	37984					351264
295	293	B	15.8	31.23	35.36	36.17	35096	31.06	35.37	36.16	73080	386360
296	298	P1	9.1	32.02	35.45	36.15	98744					485104
297	299	P2	9.8	31.68	35.39	36.13	70784	31.85	35.42	36.14	169528	555888
298	296	B	14.7	31.24	35.26	36.12	37680					593568
299	297	B	13.5	31.15	35.37	36.16	40640	31.19	35.32	36.14	78320	634208

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Flower Garden: 9.0000 Mbits/sec : Results averaged over sequence

Total : 300 pictures

SNR for luminance		34.93	dB
SNR for chrominance (Cb)		36.85	dB
SNR for chrominance (Cr)		36.43	dB
Number of bits			
Coefficients	Y	30042184	bits
	Cb	3397972	bits
	Cr	4255336	bits
	total	37695492	bits
Motion vectors		4363500	bits
Overhead		2904320	bits
TOTAL		44963312	bits
Mean value of Q scale		4.48	

I-picture : 13 pictures

SNR for luminance		36.69	dB
SNR for chrominance (Cb)		38.13	dB
SNR for chrominance (Cr)		37.46	dB
Number of bits			
Coefficients	Y	4797297	bits
	Cb	1048125	bits
	Cr	1158351	bits
	total	7003773	bits
Motion vectors		0	bits
Overhead		52179	bits
TOTAL		7055952	bits
Mean value of Q scale		2.84	

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B-picture : 198 pictures

SNR for luminance		34.46	dB
SNR for chrominance (Cb)		36.73	dB
SNR for chrominance (Cr)		36.38	dB
Number of bits			
Coefficients	Y	9437753	bits
	Cb	536898	bits
	Cr	846051	bits
	total	10820702	bits
Motion vectors		3291010	bits
Overhead		1913040	bits
TOTAL		16024752	bits
Mean value of Q scale		5.09	

P0-picture : 13 pictures

SNR for luminance		36.46	dB
SNR for chrominance (Cb)		37.32	dB
SNR for chrominance (Cr)		36.53	dB
Number of bits			
Coefficients	Y	3227964	bits
	Cb	406593	bits
	Cr	466839	bits
	total	4101396	bits
Motion vectors		77641	bits
Overhead		127739	bits
TOTAL		4306776	bits
Mean value of Q scale		3.00	

P1-picture : 38 pictures

SNR for luminance		35.96	dB
SNR for chrominance (Cb)		37.01	dB
SNR for chrominance (Cr)		36.46	dB
Number of bits			
Coefficients	Y	6723097	bits
	Cb	809304	bits
	Cr	1000849	bits
	total	8533250	bits
Motion vectors		441806	bits
Overhead		356632	bits
TOTAL		9331688	bits
Mean value of Q scale		3.24	

P2-picture : 38 pictures

SNR for luminance		35.69	dB
SNR for chrominance (Cb)		36.79	dB
SNR for chrominance (Cr)		36.33	dB
Number of bits			
Coefficients	Y	5856073	bits
	Cb	597052	bits
	Cr	783246	bits
	total	7236371	bits
Motion vectors		553043	bits
Overhead		453770	bits
TOTAL		8243184	bits
Mean value of Q scale		3.43	

Flower Garden : 9.0000 Mbits/sec : Statistics of each field and frame

COD	INP	T	Qsc	field statistics SN-Y	SN-Cb	SN-Cr	bits	frame statistics SN-Y	SN-Cb	SN-Cr	bits	cumulative bit count
0	0	I	1.2	39.34	40.41	40.13	556800					556960
1	1	P0	1.0	40.67	41.30	40.62	509552	39.95	40.83	40.37	1066352	1066512
2	6	P1	4.2	36.24	39.08	38.43	221280					1287792
3	7	P2	3.1	37.09	38.74	38.49	172160	36.65	38.91	38.46	393440	1459952
4	2	B	5.0	35.68	38.48	38.50	73544					1533496
5	3	B	4.7	36.13	38.55	38.53	85504	35.90	38.51	38.51	159048	1619000
6	4	B	5.0	35.44	38.25	38.13	79080					1698080
7	5	B	4.7	35.84	38.37	38.35	81832	35.64	38.31	38.24	160712	1779712
8	12	P1	3.1	36.77	38.06	37.61	236272					2015984
9	13	P2	4.2	35.36	37.02	36.91	154640	36.01	37.51	37.25	390912	2170624
10	8	B	4.7	35.84	38.13	37.82	80552					2251176
11	9	B	4.7	35.79	37.84	37.62	90000	35.82	37.98	37.72	170552	2341176
12	10	B	5.0	35.16	37.54	37.38	89472					2430648
13	11	B	5.0	34.94	37.20	37.07	86200	35.05	37.36	37.22	175672	2516848
14	18	P1	3.4	36.21	37.57	37.10	227168					2744016
15	19	P2	4.1	35.40	36.90	36.73	170696	35.79	37.22	36.91	397864	2914712
16	14	B	5.0	35.20	37.19	36.98	71088					2985800
17	15	B	5.0	34.88	36.80	36.70	77904	35.04	36.99	36.84	148992	3063704
18	16	B	4.7	35.21	37.28	36.99	85032					3148736
19	17	B	4.7	35.12	37.16	36.87	87720	35.17	37.22	36.93	172752	3236456
20	24	I	2.1	37.79	39.26	38.65	535600					3772120
21	25	P0	2.0	38.69	39.30	38.54	384520	38.22	39.28	38.60	920120	4156640
22	20	B	4.7	35.62	37.83	37.45	81912					4238552
23	21	B	5.0	34.82	37.21	37.10	99680	35.20	37.51	37.27	181592	4338232
24	22	B	5.0	35.05	37.89	37.71	83032					83032
25	23	B	5.0	34.97	37.39	37.22	98120	35.01	37.64	37.46	181152	181152
26	30	P1	3.4	36.27	37.57	37.23	227928					409080
27	31	P2	3.2	36.32	37.79	37.44	180504	36.29	37.68	37.33	408432	589584
28	26	B	4.3	35.50	37.67	37.59	96192					685776
29	27	B	4.0	36.16	38.24	37.86	89248	35.82	37.95	37.72	185440	775024
30	28	B	4.0	35.74	37.64	37.33	95288					870312
31	29	B	4.0	35.88	37.98	37.61	93544	35.81	37.81	37.47	188832	963856
32	36	P1	3.2	36.32	37.45	37.23	230744					1194600
33	37	P2	4.4	34.72	36.28	36.30	154264	35.44	36.83	36.74	385008	1348864
34	32	B	4.7	35.11	37.11	36.82	98672					1447536
35	33	B	5.0	34.87	37.04	36.90	91920	34.99	37.07	36.86	190592	1539456
36	34	B	5.0	34.63	36.81	36.69	90432					1629888
37	35	B	5.0	34.57	36.80	36.76	101664	34.60	36.80	36.73	192096	1731552
38	42	P1	4.2	34.82	36.47	36.00	213096					1944648
39	43	P2	3.7	35.61	36.79	36.35	198448	35.20	36.63	36.17	411544	2143096
40	38	B	5.7	34.18	36.49	36.32	91056					2234152
41	39	B	5.7	34.18	36.46	36.33	78872	34.18	36.48	36.33	169928	2313024
42	40	B	5.7	33.85	36.34	36.13	81920					2394944
43	41	B	5.0	34.56	36.77	36.32	95128	34.19	36.55	36.22	177048	2490072
44	48	I	3.0	36.81	38.21	37.63	487976					2978112
45	49	P0	3.0	36.62	37.63	36.87	293824	36.71	37.91	37.23	781800	3271936
46	44	B	5.0	34.76	37.17	36.74	88680					3360616
47	45	B	5.7	34.40	36.81	36.52	73432	34.58	36.99	36.63	162112	3434048
48	46	B	5.7	34.65	37.26	37.06	72320					72320
49	47	B	5.0	35.13	37.20	36.76	102432	34.88	37.23	36.91	174752	174752
50	54	P1	2.8	37.06	38.06	37.54	257344					432096
51	55	P2	3.6	36.01	37.20	36.79	179224	36.50	37.61	37.15	436568	611320
52	50	B	4.7	35.14	37.54	37.09	108736					720056
53	51	B	4.7	35.00	37.07	36.58	98528	35.07	37.30	36.83	207264	818584
54	52	B	4.7	35.14	37.50	37.14	93944					912528
55	53	B	4.7	35.29	37.22	36.71	78656	35.21	37.36	36.92	172600	991184
56	60	P1	3.0	36.74	37.79	37.19	253608					1244792
57	61	P2	3.0	36.65	37.58	36.92	217032	36.69	37.68	37.06	470640	1461824
58	56	B	4.3	35.51	37.53	37.33	91488					1553312
59	57	B	4.3	35.28	37.11	36.86	96280	35.40	37.31	37.09	187768	1649592
60	58	B	4.0	35.62	37.48	37.16	96016					1745608
61	59	B	4.0	35.45	37.24	36.83	104400	35.54	37.36	36.99	200416	1850008
62	66	P1	2.9	36.72	37.64	37.10	256088					2106096
63	67	P2	3.5	35.79	36.77	36.56	191376	36.23	37.19	36.82	447464	2297472
64	62	B	4.7	35.66	37.54	37.05	80880					2378352
65	63	B	4.7	35.15	37.07	36.58	91024	35.40	37.30	36.81	171904	2469376
66	64	B	4.7	35.42	37.38	36.88	81976					2551352
67	65	B	4.7	35.07	36.97	36.47	110304	35.24	37.17	36.67	192280	2661656
68	72	I	3.0	36.80	38.20	37.57	490264					3151984
69	73	P0	3.0	36.55	37.58	36.82	293832	36.67	37.88	37.18	784096	3445816
70	68	B	5.0	34.83	37.39	37.21	98736					3544552
71	69	B	4.7	35.46	37.52	37.16	77496	35.19	37.45	37.18	176232	3622048
72	70	B	4.7	35.45	37.67	37.33	78936					78936
73	71	B	4.0	36.12	37.78	37.13	95968	35.77	37.72	37.23	174904	174904
74	78	P1	2.9	36.48	37.80	37.12	252680					427584
75	79	P2	2.8	36.67	37.71	37.09	231968	36.57	37.75	37.11	484648	659552
76	74	B	4.0	35.86	37.98	37.55	80320					739872
77	75	B	4.0	35.60	37.32	36.76	101320	35.73	37.64	37.13	181640	841192
78	76	B	4.0	35.64	37.68	37.20	95184					936376
79	77	B	4.3	35.04	36.93	36.54	103512	35.33	37.29	36.86	198696	1039888
80	84	P1	3.1	36.32	37.36	36.72	244584					1284472
81	85	P2	3.3	35.99	37.04	36.58	200104	36.15	37.20	36.65	444688	1484576
82	80	B	4.3	35.26	37.19	36.88	105120					1589696
83	81	B	4.3	35.43	37.21	36.86	93736	35.34	37.20	36.87	198856	1683432
84	82	B	4.7	35.11	37.17	36.75	77544					1760976
85	83	B	4.0	35.68	37.44	36.94	89568	35.39	37.30	36.84	167112	1850544
86	90	P1	3.0	36.25	37.11	36.60	242160					2092704
87	91	P2	3.9	35.07	36.39	35.93	190616	35.62	36.74	36.25	432776	2283320
88	86	B	4.7	34.96	36.89	36.47	96288					2379608
89	87	B	5.0	34.64	36.59	36.28	91504	34.80	36.74	36.37	187792	2471112
90	88	B	5.0	34.74	36.68	36.37	87808					2558920
91	89	B	5.0	34.41	36.37	36.09	84360	34.57	36.52	36.23	172168	2643280
92	96	I	3.0	36.45	37.64	37.23	506496					3149840
93	97	P0	3.0	36.43	37.29	36.57	308880	36.44	37.46	36.89	815376	3458720
94	92	B	4.7	35.02	37.32	36.76	83768					3542488
95	93	B	5.0	34.50	36.47	36.08	89768	34.75	36.88	36.41	173536	3632256
96	94	B	4.7	35.45	37.64	37.19	81992					81992
97	95	B	4.7	35.09	37.02	36.40	103568	35.27	37.32	36.78	185560	185560
98	102	P1	3.6	35.53	36.81	36.18	226136					411696
99	103	P2	3.0	36.69	37.49	37.00	230800	36.07	37.14	36.57	456936	642496
100	98	B	5.0	34.66	36.89	36.64	93144					735640
101	99	B	4.7	35.50	37.53	37.07	70424	35.06	37.20	36.85	163568	806064
102	100	B	4.7	35.08	36.95	36.41	102920					908984
103	101	B	4.7	35.21	37.28	36.84	69024	35.14	37.11	36.62	171944	978008
104	108	P1	2.8	36.83	37.71	37.16	261080					1239088
105	109	P2	3.8	35.15	36.32	36.13	180856	35.91	36.96	36.62	441936	1419944
106	104	B	4.7	35.08	36.80	36.35	112648					1532592
107	105	B	4.7	35.29	37.25	36.94	89696	35.18	37.02	36.64	202344	1622288
108	106	B	4.7	35.21	37.09	36.71	79296					1701584
109	107	B	5.0	34.61	36.41	36.14	95000	34.90	36.74	36.42	174296	1796584
110	114	P1	3.3	35.95	36.64	36.36	230856					2027440
111	115	P2	3.1	36.33	37.24	36.69	245008	36.14	36.93	36.53	475864	2272448
112	110	B	4.7	34.66	36.68	36.29	80680					2353128
113	111	B	4.7	34.55	36.34	36.01	86160	34.60	36.51	36.15	166840	2439288
114	112	B	4.7	34.64	36.62	36.28	89648					2528936
115	113	B	5.0	34.30	36.41	36.27	87504	34.47	36.52	36.27	177152	2616440
116	120	I	3.3	36.31	37.83	37.16	501064					3117568
117	121	P0	3.0	36.57	37.31	36.66	313608	36.44	37.56	36.90	814672	3431176
118	116	B	4.7	34.97	37.01	36.63	80656					3511832
119	117	B	4.7	35.06	36.99	36.64	82584	35.01	37.00	36.63	163240	3594416
120	118	B	4.7	35.13	37.32	36.99	87672					87672
121	119	B	4.7	35.00	37.01	36.69	82768	35.06	37.16	36.84	170440	170440
122	126	P1	2.9	36.40	37.29	36.80	244200					414640
123	127	P2	3.1	36.15	37.22	36.60	219480	36.28	37.26	36.70	463680	634120
124	122	B	4.7	34.86	37.27	36.91	81328					715448
125	123	B	5.0	34.46	36.86	36.58	88312	34.65	37.06	36.74	169640	803760
126	124	B	4.7	34.73	36.92	36.56	88624					892384
127	125	B	[illegible]	34.69	36.86	36.65	92496	34.81	36.89	36.61	181120	984880

COD	INP	T	Qsc	field SN-Y	SN-Cb	SN-Cr	bits	frame SN-Y	SN-Cb	SN-Cr	bits	cumulative bit count
128	132	P1	3.2	35.90	36.80	36.24	240816					1225696
129	133	P2	3.1	36.09	36.78	36.29	229448	35.99	36.79	36.26	470264	1455144
130	128	B	5.0	34.67	36.72	36.42	82776					1537920
131	129	B	4.7	34.83	36.79	36.52	88464	34.75	36.76	36.47	171240	1626384
132	130	B	4.7	34.75	36.66	36.28	80576					1706960
133	131	B	3.7	35.74	37.24	36.67	102776	35.22	36.94	36.47	183352	1809736
134	138	P1	3.3	35.96	36.67	36.31	235952					2045688
135	139	P2	3.4	35.86	36.48	36.17	207672	35.91	36.57	36.24	443624	2253360
136	134	B	4.3	35.06	36.67	36.14	81000					2334360
137	135	B	4.3	34.92	36.45	36.00	97656	34.99	36.56	36.07	178656	2432016
138	136	B	4.7	34.55	36.35	35.96	84352					2516368
139	137	B	4.3	34.79	36.30	36.06	98416	34.67	36.33	36.01	182768	2614784
140	144	I	3.6	35.82	37.73	36.76	526168					3141016
141	145	P0	4.0	35.21	36.41	35.68	272328	35.50	37.02	36.19	798496	3413344
142	140	B	4.7	34.89	37.21	36.75	90088					3503432
143	141	B	4.7	34.68	36.53	36.11	85504	34.83	36.86	36.42	175592	3588936
144	142	B	4.7	34.68	37.15	36.62	78176					78176
145	143	B	4.3	34.64	36.52	35.99	91512	34.66	36.82	36.30	169688	169688
146	150	P1	3.2	35.49	36.95	36.30	248904					418592
147	151	P2	3.3	35.31	36.74	36.29	217160	35.40	36.84	36.30	466064	635752
148	146	B	4.7	34.34	37.07	36.62	75840					711592
149	147	B	4.7	33.95	36.22	35.77	89632	34.14	36.63	36.18	165472	801224
150	148	B	5.0	33.93	36.72	36.48	85848					887072
151	149	B	5.0	33.74	36.14	35.92	100784	33.83	36.42	36.19	186632	987856
152	156	P1	3.3	35.84	36.57	36.22	244968					1232824
153	157	P2	3.2	35.97	36.81	36.30	220664	35.90	36.69	36.26	465632	1453488
154	152	B	4.7	34.23	36.41	36.03	87256					1540744
155	153	B	4.7	34.48	36.34	36.08	82512	34.35	36.37	36.05	169768	1623256
156	154	B	4.7	34.66	36.57	36.10	85688					1708944
157	155	B	4.7	34.66	36.49	36.28	83856	34.66	36.53	36.19	169544	1792800
158	162	P1	3.1	36.43	36.95	36.46	257040					2049840
159	163	P2	3.4	35.94	36.73	36.14	217072	36.18	36.84	36.30	474112	2266912
160	158	B	4.7	34.57	36.37	36.05	80136					2347048
161	159	B	4.3	35.03	36.68	36.18	88400	34.79	36.52	36.11	168536	2435448
162	160	B	4.3	34.99	36.73	36.35	93520					2528968
163	161	B	4.0	35.42	36.85	36.34	95672	35.20	36.79	36.34	189192	2624640
164	168	I	2.6	37.03	38.39	37.65	564408					3180112
165	169	P0	3.0	36.62	37.33	36.53	322608	36.82	37.83	37.05	887016	3511720
166	164	B	4.7	34.76	36.81	36.54	73216					3584936
167	165	B	5.0	34.28	36.38	36.20	81352	34.52	36.59	36.37	154568	3666288
168	166	B	5.0	34.49	37.11	37.02	82640					82640
169	167	B	5.0	34.33	36.59	36.30	84960	34.41	36.84	36.64	167600	167600
170	174	P1	3.0	36.48	37.61	36.84	256760					424360
171	175	P2	3.0	36.35	37.33	36.62	224904	36.41	37.47	36.73	481664	649264
172	170	B	4.7	35.39	37.71	37.19	74104					723368
173	171	B	5.0	34.89	36.84	36.30	73752	35.13	37.26	36.72	147856	797120
174	172	B	5.0	34.89	37.34	36.93	78544					873664
175	173	B	4.7	34.80	36.89	36.42	77000	34.84	37.11	36.67	153544	950664
176	180	P1	3.1	36.41	37.04	36.58	261400					1212064
177	181	P2	3.2	36.07	36.81	36.37	229912	36.24	36.92	36.48	491312	1441976
178	176	B	4.7	35.13	37.01	36.54	67888					1509864
179	177	B	4.7	34.83	36.64	36.25	76304	34.98	36.82	36.39	144192	1586168
180	178	B	4.7	35.06	36.96	36.56	67976					1654144
181	179	B	4.7	34.74	36.59	36.22	73536	34.90	36.77	36.39	141512	1727680
182	186	P1	3.2	36.12	36.68	36.19	271520					1999200
183	187	P2	3.0	36.21	36.88	36.35	250528	36.16	36.78	36.27	522048	2249728
184	182	B	5.0	34.67	36.48	36.22	77616					2327344
185	183	B	5.0	34.48	36.45	36.18	84984	34.57	36.46	36.20	162600	2412328
186	184	B	5.0	34.43	36.29	36.00	73792					2486120
187	185	B	5.0	34.37	36.30	36.02	76312	34.40	36.30	36.01	150104	2562432
188	192	I	2.6	37.13	38.52	37.70	574920					3137416
189	193	P0	3.0	36.63	37.27	36.56	329680	36.87	37.85	37.09	904600	3467096
190	188	B	5.0	34.89	37.23	36.98	69768					3536864
191	189	B	5.0	34.47	36.42	36.25	79408	34.67	36.81	36.60	149176	3616272
192	190	B	5.0	34.68	37.24	37.00	77152					77152
193	191	B	5.0	34.32	36.49	36.19	88384	34.50	36.85	36.58	165536	165536
194	198	P1	2.7	36.73	37.61	36.77	266760					432296
195	199	P2	3.7	35.54	36.85	36.40	220168	36.09	37.21	36.58	486928	652464
196	194	B	5.7	34.47	37.13	36.81	75984					728448
197	195	B	6.0	34.21	37.10	36.92	73128	34.34	37.11	36.86	149112	801576
198	196	B	6.0	34.10	36.87	36.36	72816					874392
199	197	B	5.7	34.40	37.04	36.87	71360	34.25	36.96	36.61	144176	945752
200	204	P1	3.0	36.29	36.99	36.59	246184					1191936
201	205	P2	3.1	36.26	37.20	36.57	280600	36.27	37.09	36.58	526784	1472536
202	200	B	5.0	34.39	36.74	36.49	83472					1556008
203	201	B	5.0	34.26	36.39	36.00	99584	34.33	36.56	36.24	183056	1655592
204	202	B	5.0	34.50	36.81	36.50	87552					1743144
205	203	B	5.0	34.33	36.50	36.13	96952	34.41	36.65	36.31	184504	1840096
206	210	P1	4.0	34.76	36.20	35.67	192912					2033008
207	211	P2	4.1	34.86	35.78	35.43	218016	34.81	35.99	35.55	410928	2251024
208	206	B	6.3	33.45	35.82	35.64	71056					2322080
209	207	B	6.7	33.04	35.89	35.60	69656	33.24	35.85	35.62	140712	2391736
210	208	B	6.7	32.83	35.64	35.36	68392					2460128
211	209	B	6.0	33.07	35.64	35.35	96648	32.95	35.64	35.35	165040	2556776
212	216	I	2.6	36.79	38.19	37.38	596104					3152944
213	217	P0	3.0	36.32	37.03	36.18	340512	36.55	37.57	36.74	936616	3493456
214	212	B	6.0	33.45	36.13	35.82	85368					3578824
215	213	B	6.7	32.93	35.93	35.65	67264	33.18	36.03	35.73	152632	3646088
216	214	B	6.7	33.16	36.63	36.35	71232					71232
217	215	B	6.0	33.60	36.11	35.71	76544	33.38	36.36	36.02	147776	147776
218	222	P1	3.8	35.16	36.61	35.84	217264					365040
219	223	P2	3.1	36.10	37.23	36.52	240976	35.61	36.91	36.17	458240	606016
220	218	B	5.7	34.06	36.89	36.45	83200					689216
221	219	B	5.7	34.09	36.69	36.22	79280	34.07	36.79	36.33	162480	768496
222	220	B	5.7	33.94	36.57	36.02	82744					851240
223	221	B	5.7	34.04	36.88	36.49	72992	33.99	36.72	36.25	155736	924232
224	228	P1	3.2	35.87	36.87	36.20	244800					1169032
225	229	P2	4.1	34.53	35.85	35.49	196632	35.15	36.33	35.83	441432	1365664
226	224	B	5.0	33.99	36.14	35.57	88496					1454160
227	225	B	5.3	33.72	36.17	35.87	94416	33.85	36.15	35.72	182912	1548576
228	226	B	5.7	33.64	36.28	35.89	79672					1628248
229	227	B	4.7	34.25	36.20	35.63	89424	33.93	36.24	35.76	169096	1717672
230	234	P1	3.7	34.90	35.93	35.61	218720					1936392
231	235	P2	3.2	35.77	36.64	35.94	254000	35.32	36.27	35.77	472720	2190392
232	230	B	5.7	33.71	36.09	35.78	82856					2273248
233	231	B	6.0	33.25	35.84	35.45	82680	33.48	35.97	35.62	165536	2355928
234	232	B	6.0	33.16	35.75	35.41	83640					2439568
235	233	B	6.0	33.28	35.96	35.63	74584	33.22	35.85	35.52	158224	2514152
236	240	I	2.6	36.79	38.24	37.40	594600					3108816
237	241	P0	3.0	36.35	37.13	36.29	337376	36.56	37.65	36.81	931976	3446192
238	236	B	5.7	33.84	36.72	36.29	63624					3509816
239	237	B	5.0	34.23	36.53	35.99	70512	34.03	36.62	36.14	134136	3580328
240	238	B	4.7	34.70	37.28	36.69	80264					80264
241	239	B	4.7	34.68	36.83	36.23	80288	34.69	37.05	36.45	160552	160552
242	246	P1	3.5	35.65	36.81	36.30	237480					398032
243	247	P2	3.4	35.84	37.09	36.62	219368	35.74	36.94	36.45	456848	617400
244	242	B	4.7	35.14	37.53	37.06	83984					701384
245	243	B	5.0	34.48	36.62	36.13	83912	34.80	37.05	36.57	167896	785296
246	244	B	5.0	34.53	36.95	36.56	87032					872328
247	245	B	5.7	33.99	36.82	36.46	80560	34.25	36.89	36.51	167592	952888
248	252	P1	3.6	35.34	36.41	35.75	244520					1197408
249	253	P2	4.0	34.84	36.15	35.68	197136	35.09	36.28	35.71	441656	1394544
250	248	B	5.7	33.93	36.33	35.83	76320					1470864
251	249	B	5.7	34.21	36.62	36.20	61552	34.07	36.48	36.01	137872	1532416
252	250	B	5.0	34.57	36.61	35.87	72288					1604704
253	251	B	5.7	33.89	36.23	35.82	65008	34.22	36.42	35.84	137296	1669712
254	258	P1	3.0	35.92	36.83	35.96	285976					1955688
255	259	P2	3.2	35.53	36.33	35.72	244416	35.72	36.57	35.84	530392	2200104
256	254	B	5.0	33.77	35.87	35.45	100800					2300904
257	255	B	5.0	33.72	35.82	35.50	99352	33.75	35.85	35.48	200152	2400256
258	256	B	5.0	33.77	36.05	35.61	91472					2491728
250	257	B	5.0	33.78	35.84	35.58	79208	33.77	35.95	35.60	170680	2570936

260	264	I	3.5	35.58	37.03	36.48	566888					3137888
261	265	P0	4.0	35.06	36.04	35.09	298384	35.31	36.50	35.72	865272	3436272
262	260	B	5.8	33.75	36.43	36.06	58840					3495112
263	261	B	5.5	33.59	35.97	35.51	65008	33.67	36.20	35.78	123848	3560120
264	262	B	5.5	34.10	36.80	36.39	58304					58304
265	263	B	5.8	33.29	35.75	35.33	60000	33.68	36.24	35.83	118304	118304
266	270	P1	3.0	35.90	36.87	36.08	260808					379112
267	271	P2	3.7	34.96	36.10	35.51	228912	35.40	36.47	35.78	489720	608024
268	266	B	6.5	33.73	36.54	36.22	46280					654304
269	267	B	6.3	33.25	35.66	35.08	56176	33.48	36.08	35.61	102456	710480
270	268	B	6.5	33.48	36.44	36.05	51848					762328
271	269	B	6.8	32.81	35.62	35.31	51560	33.14	36.01	35.66	103408	813888
272	276	P1	3.2	35.49	36.42	35.96	257088					1070976
273	277	P2	3.2	35.38	36.41	35.70	273072	35.44	36.42	35.83	530160	1344048
274	272	B	6.5	33.57	36.09	35.75	45120					1389168
275	273	B	6.5	33.16	35.66	35.51	51192	33.36	35.87	35.63	96312	1440360
276	274	B	6.2	33.69	36.04	35.84	43152					1483512
277	275	B	6.3	33.12	35.61	35.34	50144	33.39	35.82	35.58	93296	1533656
278	282	P1	3.2	35.55	36.42	35.75	264656					1798312
279	283	P2	3.2	35.57	36.42	36.01	263656	35.56	36.42	35.88	528312	2061968
280	278	B	6.5	33.26	35.86	35.48	45744					2107712
281	279	B	6.5	33.02	35.77	35.60	53152	33.14	35.81	35.54	98896	2160864
282	280	B	6.5	32.96	35.85	35.49	50184					2211048
283	281	B	6.5	33.13	35.91	35.67	53000	33.04	35.88	35.58	103184	2264048
284	288	I	3.6	35.63	37.11	36.41	554684					2818776
285	289	P0	4.0	34.96	35.94	35.04	301672	35.28	36.49	35.67	856336	3120448
286	284	B	5.8	34.44	36.95	36.43	42248					3162696
287	285	B	5.8	34.22	36.38	35.90	46344	34.33	36.66	36.16	88592	3209040
288	286	B	5.8	34.15	36.72	36.43	44656					44656
289	287	B	5.8	33.71	35.88	35.44	48224	33.92	36.28	35.91	92880	92880
290	294	P1	3.0	35.56	36.48	35.61	292280					385160
291	295	P2	3.4	34.97	36.27	35.61	256248	35.26	36.37	35.61	548528	641408
292	290	B	6.5	33.34	36.39	36.08	49600					691008
293	291	B	6.5	32.83	35.55	35.01	62600	33.08	35.95	35.51	112200	753608
294	292	B	6.5	32.92	36.03	35.59	65944					819552
295	293	B	6.5	32.72	35.82	35.26	56232	32.82	35.92	35.42	122176	875784
296	298	P1	3.2	35.36	36.12	35.48	259656					1135440
297	299	P2	3.5	34.86	36.07	35.66	235448	35.10	36.10	35.57	495104	1370888
298	296	B	5.3	33.61	35.85	35.20	61232					1432120
299	297	B	6.0	33.34	35.77	35.35	43088	33.48	35.81	35.28	104320	1475208

Table Tennis : 9.0000 Mbits/sec : Results averaged over sequence

Total : 300 pictures
SNR for luminance 34.36 dB
SNR for chrominance (Cb) 40.83 dB
SNR for chrominance (Cr) 41.87 dB
Number of bits
Coefficients Y 32676459 bits
Cb 2628843 bits
Cr 2461813 bits
total 37767115 bits
Motion vectors 4284502 bits
Overhead 2914527 bits
TOTAL 44966144 bits
Mean value of Q scale 3.35

I-picture : 13 pictures
SNR for luminance 36.75 dB
SNR for chrominance (Cb) 41.00 dB
SNR for chrominance (Cr) 41.90 dB
Number of bits
Coefficients Y 4513078 bits
Cb 494440 bits
Cr 491243 bits
total 5498761 bits
Motion vectors 0 bits
Overhead 52135 bits
TOTAL 5550896 bits
Mean value of Q scale 2.04

B-picture : 198 pictures
SNR for luminance 33.97 dB
SNR for chrominance (Cb) 40.88 dB
SNR for chrominance (Cr) 41.94 dB
Number of bits
Coefficients Y 12849944 bits
Cb 965421 bits
Cr 870648 bits
total 14686013 bits
Motion vectors 3223201 bits
Overhead 1949378 bits
TOTAL 19858592 bits
Mean value of Q scale 3.67

P0-picture : 13 pictures
SNR for luminance 36.81 dB
SNR for chrominance (Cb) 40.95 dB
SNR for chrominance (Cr) 41.97 dB
Number of bits
Coefficients Y 3900750 bits
Cb 312141 bits
Cr 325246 bits
total 4538137 bits
Motion vectors 110751 bits
Overhead 126752 bits
TOTAL 4775640 bits
Mean value of Q scale 2.08

P1-picture : 38 pictures
SNR for luminance 34.99 dB
SNR for chrominance (Cb) 40.68 dB
SNR for chrominance (Cr) 41.74 dB

Number of bits
Coefficients Y 6512288 bits
Cb 538124 bits
Cr 469935 bits
total 7520347 bits
Motion vectors 403520 bits
Overhead 358541 bits
TOTAL 8282408 bits
Mean value of Q scale 2.82

P2-picture : 38 pictures
SNR for luminance 34.62 dB
SNR for chrominance (Cb) 40.59 dB
SNR for chrominance (Cr) 41.57 dB
Number of bits
Coefficients Y 4900399 bits
Cb 318717 bits
Cr 304741 bits
total 5523857 bits
Motion vectors 547030 bits
Overhead 426761 bits
TOTAL 6497648 bits
Mean value of Q scale 3.08

Table Tennis : 9.0000 Mbits/sec : Statistics of each field and frame

				field statistics				frame statistics				cumulative
COD	INP	T	Qsc	SN-Y	SN-Cb	SN-Cr	bits	SN-Y	SN-Cb	SN-Cr	bits	bit count
0	0	I	1.2	37.41	40.99	42.10	595360					595520
1	1	P0	1.0	39.91	41.06	42.17	815392	38.48	41.03	42.14	1410752	1410912
2	6	P1	4.3	32.37	40.50	41.79	192408					1603320
3	7	P2	5.9	30.75	40.13	41.53	141504	31.49	40.31	41.66	333912	1744824
4	2	B	6.0	31,79	40.60	41.89	45400					1790224
5	3	B	6.0	32.06	40.47	41.54	41744	31.92	40.54	41.71	87144	1831968
6	4	B	6.0	31.23	40.51	41.81	63568					1895536
7	5	B	6.0	32.00	40.58	41.64	45440	31.60	40.54	41.72	109008	1940976
8	12	P1	6.3	30.16	39.04	40.96	209432					2150408
9	13	P2	4.9	31.53	39.40	41.10	224832	30.79	39.21	41.03	434264	2375240
10	8	B	7.0	30.17	39.97	41.63	52792					2428032
11	9	B	7.0	30.40	39.74	41.42	40624	30.29	39.85	41.52	93416	2468656
12	10	B	7.0	29.68	39.21	41.19	46856					2515512
13	11	B	7.0	29.89	39.51	41.20	50464	29.78	39.36	41.19	97320	2565976
14	18	P1	5.4	31.32	38.95	40.72	248040					2814016
15	19	P2	6.4	30.09	39.20	40.76	204280	30.66	39.07	40.74	452320	3018296
16	14	B	7.3	29.27	39.08	40.79	58296					3076592
17	15	B	7.3	29.28	39.21	40.93	64368	29.27	39.14	40.86	122664	3140960
18	16	B	9.0	28.48	39.09	40.78	62280					3203240
19	17	B	9.0	28.22	39.24	40.85	73768	28.35	39.17	40.81	136048	3277008
20	24	I	2.0	36.09	40.43	41.72	527576					3804648
21	25	P0	2.0	37.91	40.00	41.54	620920	36.91	40.21	41.63	1148496	4425568
22	20	B	9.0	28.73	39.37	41.05	64320					4489888
23	21	B	7.0	29.57	39.27	41.03	59616	29.13	39.32	41.04	123936	4549504
24	22	B	8.0	29.49	39.79	41.51	64904					64904
25	23	B	7.0	30.37	39.86	41.45	65072	29.91	39.82	41.48	129976	129976
26	30	P1	5.3	31.38	39.33	40.89	237768					367744
27	31	P2	5.9	30.75	38.99	40.67	235056	31.05	39.15	40.78	472824	602800
28	26	B	9.0	29.15	39.98	41.26	61216					664016
29	27	B	8.0	29.67	39.66	40.98	67040	29.40	39.82	41.12	128256	731056
30	28	B	8.0	29.49	39.84	41.09	63680					794736
31	29	B	8.3	29.06	39.19	40.73	54768	29.27	39.50	40.91	118448	849504
32	36	P1	5.1	31.55	39.25	40.74	235544					1085048
33	37	P2	5.4	31.05	38.86	40.51	236824	31.29	39.05	40.63	472368	1321872
34	32	B	6.0	30.48	39.33	40.88	62760					1384632
35	33	B	8.0	29.01	39.00	40.62	62592	29.68	39.16	40.75	125352	1447224
36	34	B	6.7	30.03	39.50	40.89	67472					1514696
37	35	B	8.0	28.96	38.85	40.47	65752	29.46	39.16	40.67	133224	1580448
38	42	P1	5.0	31.54	39.13	40.61	220504					1800952
39	43	P2	4.9	31.43	38.84	40.45	231280	31.48	38.98	40.53	451784	2032232
40	38	B	6.7	30.05	39.36	40.78	75920					2108152
41	39	B	6.3	30.16	38.94	40.58	78568	30.11	39.14	40.68	154488	2186720
42	40	B	6.3	30.49	39.29	40.74	80848					2267568
43	41	B	8.0	29.33	38.87	40.41	54360	29.87	39.08	40.57	135208	2321928
44	48	I	3.3	34.34	39.75	41.10	428336					2750328
45	49	P0	3.0	35.04	39.40	40.96	385848	34.68	39.57	41.03	814184	3136176
46	44	B	8.0	29.24	39.08	40.51	85944					3222120
47	45	B	7.3	29.55	39.21	40.59	87832	29.39	39.15	40.55	173776	3309952
48	46	B	8.0	29.38	39.13	40.55	96904					96904
49	47	B	8.0	29.25	39.11	40.61	101640	29.32	39.12	40.58	198544	198544
50	54	P1	4.3	32.91	39.69	41.26	214096					412640
51	55	P2	3.0	34.45	40.28	41.69	224856	33.61	39.97	41.47	438952	637496
52	50	B	6.0	31.04	39.48	41.22	133464					770960
53	51	B	6.0	31.29	39.64	41.29	118088	31.17	39.56	41.26	251552	889048
54	52	B	6.0	31.40	39.75	41.37	100568					989616
55	53	B	5.3	32.03	39.89	41.56	100920	31.70	39.82	41.47	201488	1090536
56	60	P1	3.8	33.83	40.17	41.82	200968					1291504
57	61	P2	4.3	33.04	40.32	41.69	127440	33.42	40.24	41.65	328408	1418944
58	56	B	5.0	32.40	40.27	41.72	97192					1518136
59	57	B	5.0	32.29	40.18	41.63	109312	32.35	40.23	41.67	206504	1625448
60	58	B	5.0	32.49	40.20	41.68	98632					1724080
61	59	B	5.0	32.30	40.17	41.57	94056	32.39	40.19	41.63	192688	1818136

62	66	P1	3.2	34.62	40.82	42.04	200192					2018328
63	67	P2	3.3	34.45	40.96	42.09	144536	34.53	40.89	42.06	344728	2162864
64	62	B	5.0	32.83	40.49	41.87	102792					2265656
65	63	B	4.3	33.59	40.72	42.20	111496	33.19	40.60	42.03	214288	2377152
66	64	B	4.7	33.17	40.70	42.06	99824					2476976
67	65	B	4.3	33.65	40.78	42.21	100864	33.40	40.74	42.14	200688	2577840
68	72	I	3.8	35.09	40.82	41.89	260560					2838464
69	73	P0	4.0	34.16	41.01	42.37	108528	34.60	40.92	42.12	369088	2946992
70	68	B	3.7	34.17	41.21	42.53	116712					3063704
71	69	B	3.3	34.70	41.34	42.63	122512	34.43	41.28	42.58	239224	3186216
72	70	B	3.0	35.15	41.59	42.94	128832					128832
73	71	B	3.0	35.17	41.64	43.01	119680	35.16	41.62	42.97	248512	248512
74	78	P1	2.3	36.46	41.65	42.85	212464					460976
75	79	P2	2.4	36.48	41.85	43.06	166752	36.47	41.75	42.95	379216	627728
76	74	B	2.7	35.59	41.69	43.05	131496					759224
77	75	B	2.7	35.92	41.86	43.20	138912	35.75	41.77	43.13	270408	898136
78	76	B	2.7	35.93	41.85	43.12	133600					1031736
79	77	B	2.3	36.36	42.07	43.37	134400	36.14	41.96	43.25	268000	1166136
80	84	P1	1.9	37.07	42.05	43.20	211528					1377664
81	85	P2	2.0	37.02	42.17	43.24	161528	37.04	42.11	43.22	373056	1539192
82	80	B	2.3	36.56	42.18	43.36	132920					1672112
83	81	B	2.3	36.66	42.24	43.44	134720	36.61	42.21	43.40	267640	1806832
84	82	B	2.3	36.62	42.15	43.32	136272					1943104
85	83	B	2.0	36.99	42.33	43.48	154152	36.80	42.24	43.40	290424	2097256
86	90	P1	1.9	37.21	42.17	43.15	204936					2302192
87	91	P2	2.0	37.06	42.20	43.15	153264	37.13	42.18	43.15	358200	2455456
88	86	B	2.0	37.06	42.29	43.31	153456					2608912
89	87	B	2.3	36.87	42.30	43.38	131976	36.96	42.30	43.34	285432	2740888
90	88	B	2.3	36.85	42.25	43.28	132776					2873664
91	89	B	2.3	36.89	42.25	43.26	121072	36.87	42.25	43.27	253848	2994736
92	96	I	2.5	37.08	41.70	42.63	247000					3241800
93	97	P0	3.0	36.06	41.55	42.56	101312	36.54	41.62	42.60	348312	3343112
94	92	B	2.0	37.28	42.50	43.54	149264					3492376
95	93	B	2.0	37.30	42.49	43.57	155832	37.29	42.49	43.55	305096	3648208
96	94	B	2.0	37.31	42.51	43.61	155896					155896
97	95	B	2.0	37.31	42.56	43.56	143344	37.31	42.54	43.58	299240	299240
98	102	P1	2.7	36.75	41.85	42.58	190352					489592
99	103	P2	2.6	36.83	41.82	42.57	133024	36.79	41.83	42.57	323376	622616
100	98	B	3.0	36.44	42.07	43.06	94872					717488
101	99	B	3.0	36.41	42.00	42.91	101280	36.43	42.04	42.98	196152	818768
102	100	B	3.0	36.36	41.86	42.81	101352					920120
103	101	B	3.0	36.46	41.86	42.75	91880	36.41	41.86	42.78	193232	1012000
104	108	P1	1.5	38.10	42.30	43.22	263568					1275568
105	109	P2	1.8	37.65	42.18	43.05	167408	37.87	42.24	43.13	430976	1442976
106	104	B	2.0	37.35	42.29	43.20	147160					1590136
107	105	B	2.3	37.01	42.07	43.06	129288	37.18	42.18	43.13	276448	1719424
108	106	B	2.0	37.39	42.24	43.10	147880					1867304
109	107	B	2.0	37.44	42.20	43.12	138576	37.41	42.22	43.11	286456	2005880
110	114	P1	1.5	38.23	42.37	43.26	253376					2259256
111	115	P2	2.2	37.18	41.91	42.71	147640	37.67	42.13	42.98	401016	2406896
112	110	B	2.0	37.61	42.44	43.39	133968					2540864
113	111	B	2.3	37.39	42.28	43.22	129384	37.50	42.36	43.30	263352	2670248
114	112	B	2.0	37.62	42.47	43.48	134688					2804936
115	113	B	2.0	37.56	42.35	43.29	126720	37.59	42.41	43.39	261408	2931656
116	120	I	1.7	37.87	41.78	42.60	314976					3246696
117	121	P0	2.0	37.21	42.05	42.94	162776	37.52	41.91	42.76	477752	3409472
118	116	B	2.3	37.30	42.26	43.13	122912					3532384
119	117	B	2.3	37.31	42.32	43.21	125392	37.30	42.29	43.17	248304	3657776
120	118	B	2.7	36.96	42.18	43.05	111512					111512
121	119	B	2.0	37.46	42.44	43.42	129952	37.21	42.31	43.23	241464	241464
122	126	P1	1.6	37.85	42.10	42.98	247216					488680
123	127	P2	1.9	37.27	42.01	42.82	165664	37.55	42.06	42.90	412880	654344
124	122	B	2.0	37.35	42.22	43.29	137784					792128
125	123	B	2.3	37.02	42.17	43.21	111008	37.18	42.19	43.25	248792	903136
126	124	B	2.0	37.40	42.20	43.28	139168					1042304
127	125	B	2.0	37.34	42.15	43.22	134504	37.37	42.18	43.25	273672	1176808

128	132	P1	2.0	37.37	41.93	42.62	226808					1403616
129	133	P2	2.3	36.88	41.73	42.37	145232	37.12	41.83	42.49	372040	1548848
130	128	B	2.3	36.94	41.93	42.81	112096					1660944
131	129	B	2.0	37.35	42.06	43.04	145288	37.14	41.99	42.92	257384	1806232
132	130	B	2.3	36.93	41.87	42.80	116144					1922376
133	131	B	2.3	36.89	41.73	42.63	114680	36.91	41.80	42.71	230824	2037056
134	138	P1	4.8	34.34	39.36	39.84	285672					2322728
135	139	P2	5.0	33.60	39.15	39.25	130208	33.96	39.25	39.54	415880	2452936
136	134	B	6.0	33.54	39.47	39.94	46416					2499352
137	135	B	6.0	33.29	39.12	39.20	43136	33.41	39.29	39.55	89552	2542488
138	136	B	6.0	33.60	39.51	39.99	39376					2581864
139	137	B	6.0	33.35	39.17	39.26	32376	33.47	39.34	39.61	71752	2614240
140	144	I	1.9	37.24	41.13	41.70	406560					3020864
141	145	P0	2.0	36.83	41.15	41.87	285544	37.03	41.14	41.78	692104	3306408
142	140	B	6.0	35.01	41.07	41.68	33112					3339520
143	141	B	6.0	34.89	40.79	41.28	33256	34.95	40.93	41.48	66368	3372776
144	142	B	6.0	35.03	41.14	41.77	35608					35608
145	143	B	6.0	35.01	40.91	41.37	28808	35.02	41.02	41.56	64416	64416
146	150	P1	1.0	38.52	41.76	42.66	287328					351744
147	151	P2	2.1	36.57	41.25	41.99	137440	37.44	41.50	42.31	424768	489184
148	146	B	2.7	36.36	41.56	42.44	69992					559176
149	147	B	3.0	36.10	41.18	41.94	72296	36.23	41.37	42.18	142288	631472
150	148	B	2.7	36.38	41.55	42.45	70608					702080
151	149	B	2.7	36.10	41.16	41.90	71256	36.23	41.35	42.16	141864	773336
152	156	P1	1.0	38.62	41.89	42.73	240016					1013352
153	157	P2	1.0	38.62	41.91	42.81	243352	38.62	41.90	42.77	483368	1256704
154	152	B	2.0	37.40	41.90	42.77	119792					1376496
155	153	B	2.0	37.33	41.78	42.68	125744	37.37	41.84	42.73	245536	1502240
156	154	B	2.0	37.44	41.89	42.77	113080					1615320
157	155	B	2.0	37.37	41.81	42.74	115216	37.40	41.85	42.76	228296	1730536
158	162	P1	1.0	38.63	41.96	42.82	210560					1941096
159	163	P2	1.0	38.63	41.97	42.91	206464	38.63	41.97	42.86	417024	2147560
160	158	B	1.0	38.69	42.05	42.92	175496					2323056
161	159	B	1.0	38.67	41.99	42.94	180424	38.68	42.02	42.93	355920	2503480
162	160	B	1.0	38.68	42.05	42.92	178760					2682240
163	161	B	1.0	38.64	42.03	42.94	178864	38.66	42.04	42.93	357624	2861104
164	168	I	1.0	38.30	41.62	42.27	460544					3321712
165	169	P0	1.0	38.95	42.00	43.03	432664	38.61	41.81	42.63	893208	3754376
166	164	B	2.0	37.58	42.19	43.21	107768					3862144
167	165	B	2.0	37.65	42.28	43.27	102904	37.61	42.23	43.24	210672	3965048
168	166	B	2.0	37.58	42.23	43.19	110048					110048
169	167	B	2.0	37.63	42.27	43.33	104952	37.60	42.25	43.26	215000	215000
170	174	P1	1.4	37.77	41.78	42.76	215360					430360
171	175	P2	1.2	38.08	41.95	42.98	193656	37.92	41.86	42.87	409016	624016
172	170	B	2.0	37.26	41.89	42.88	123352					747368
173	171	B	2.0	37.36	42.01	43.08	117672	37.31	41.95	42.98	241024	865040
174	172	B	2.0	37.25	41.87	42.87	124968					990008
175	173	B	2.0	37.35	41.97	43.04	118104	37.30	41.92	42.96	243072	1108112
176	180	P1	1.2	38.17	41.91	42.85	199808					1307920
177	181	P2	1.3	37.82	42.02	42.94	158672	37.99	41.96	42.90	358480	1466592
178	176	B	2.0	37.39	41.95	42.96	112120					1578712
179	177	B	2.0	37.47	42.03	43.08	110920	37.43	41.99	43.02	223040	1689632
180	178	B	2.0	37.41	41.94	42.96	109080					1798712
181	179	B	2.0	37.45	42.02	43.08	102280	37.43	41.98	43.02	211360	1900992
182	186	P1	1.0	38.59	42.06	42.94	201944					2102936
183	187	P2	1.2	38.26	42.10	43.10	175696	38.42	42.08	43.02	377640	2278632
184	182	B	1.7	37.70	42.04	43.02	107912					2386544
185	183	B	1.7	37.66	42.10	43.11	111848	37.68	42.07	43.07	219760	2498392
186	184	B	1.7	37.67	42.05	42.98	107720					2606112
187	185	B	1.3	38.05	42.10	43.14	134648	37.86	42.07	43.06	242368	2740760
188	192	I	1.0	38.30	41.61	42.30	465032					3205856
189	193	P0	1.0	38.94	41.98	42.90	435608	38.61	41.79	42.59	900640	3641464
190	188	B	2.0	37.61	42.24	43.21	100392					3741856
191	189	B	2.0	37.61	42.30	43.33	98680	37.61	42.27	43.27	199072	3840536
192	190	B	2.0	37.60	42.18	43.12	101672					101672
193	191	B	2.0	37.65	42.29	43.33	98568	37.62	42.24	43.22	200240	200240

194	198	P1	3.8	34.54	39.41	39.96	368840					569080
195	199	P2	4.0	33.92	39.41	39.77	188040	34.22	39.41	39.87	556880	757120
196	194	B	5.0	33.07	39.58	40.09	84152					841272
197	195	B	5.0	32.86	39.32	39.63	80360	32.96	39.45	39.86	164512	921632
198	196	B	5.0	33.26	39.62	40.12	56568					978200
199	197	B	5.0	33.06	39.38	39.72	47064	33.16	39.50	39.92	103632	1025264
200	204	P1	1.5	37.54	41.11	42.23	384520					1409784
201	205	P2	5.5	33.31	39.32	39.87	95200	34.93	40.12	40.89	479720	1504984
202	200	B	4.0	34.96	40.55	41.31	44968					1549952
203	201	B	4.0	34.10	39.58	40.07	57520	34.51	40.04	40.65	102488	1607472
204	202	B	4.0	35.06	40.68	41.54	42688					1650160
205	203	B	4.0	33.98	39.58	40.13	53880	34.49	40.09	40.78	96568	1704040
206	210	P1	1.0	38.75	41.37	42.56	359792					2063832
207	211	P2	1.5	37.60	40.99	42.01	319072	38.14	41.17	42.28	678864	2382904
208	206	B	2.0	36.98	41.22	42.30	113960					2496864
209	207	B	2.0	36.60	40.75	41.85	149552	36.79	40.98	42.06	263512	2646416
210	208	B	2.0	36.99	41.22	42.34	114072					2760488
211	209	B	2.0	36.65	40.88	42.01	133864	36.82	41.05	42.17	247936	2894352
212	216	I	1.1	37.99	41.17	42.08	510416					3404832
213	217	P0	1.0	38.90	41.57	42.78	490704	38.42	41.36	42.41	1001120	3895536
214	212	B	2.0	37.14	41.72	42.97	104192					3999728
215	213	B	2.0	37.08	41.53	42.73	105432	37.11	41.62	42.85	209624	4105160
216	214	B	2.0	37.12	41.68	42.93	112720					112720
217	215	B	2.0	37.12	41.62	42.88	104232	37.12	41.65	42.91	216952	216952
218	222	P1	2.0	36.51	41.15	42.27	185352					402304
219	223	P2	1.8	36.86	41.31	42.52	189656	36.68	41.23	42.40	375008	591960
220	218	B	2.7	36.04	41.34	42.45	60000					651960
221	219	B	2.3	36.43	41.40	42.70	65768	36.23	41.37	42.57	125768	717728
222	220	B	2.7	36.00	41.27	42.37	60264					777992
223	221	B	2.7	36.21	41.33	42.57	54608	36.11	41.30	42.47	114872	832600
224	228	P1	2.0	36.55	41.02	42.09	181184					1013784
225	229	P2	2.1	36.40	41.08	42.32	163304	36.47	41.05	42.20	344488	1177088
226	224	B	2.7	36.01	41.16	42.21	60304					1237392
227	225	B	2.3	36.28	41.25	42.53	65408	36.14	41.20	42.37	125712	1302800
228	226	B	2.7	35.89	41.13	42.20	62224					1365024
229	227	B	2.7	35.88	41.17	42.39	59176	35.89	41.15	42.29	121400	1424200
230	234	P1	2.0	36.58	40.94	41.94	178120					1602320
231	235	P2	2.1	36.41	41.00	42.19	165672	36.50	40.97	42.07	343792	1767992
232	230	B	2.7	36.11	41.05	42.13	62224					1830216
233	231	B	2.7	36.04	41.10	42.33	60312	36.07	41.08	42.23	122536	1890528
234	232	B	2.7	35.95	41.05	42.06	69464					1959992
235	233	B	2.7	35.94	41.07	42.28	65320	35.95	41.06	42.17	134784	2025312
236	240	I	1.0	38.11	41.26	42.12	514192					2539568
237	241	P0	1.0	38.92	41.56	42.82	490440	38.49	41.41	42.45	1004632	3030008
238	236	B	2.0	36.98	41.75	42.99	113400					3143408
239	237	B	2.0	37.06	41.57	42.98	114160	37.02	41.66	42.99	227560	3257568
240	238	B	2.3	36.43	41.68	42.90	84456					84456
241	239	B	2.0	37.01	41.59	43.01	108744	36.71	41.64	42.95	193200	193200
242	246	P1	3.0	35.49	40.81	41.70	164016					357216
243	247	P2	2.5	36.10	40.70	41.82	158136	35.79	40.75	41.76	322152	515352
244	242	B	2.7	35.75	41.33	42.39	95608					610960
245	243	B	2.7	35.97	41.33	42.62	95264	35.86	41.33	42.51	190872	706224
246	244	B	2.3	35.94	41.29	42.42	107376					813600
247	245	B	2.7	35.76	41.17	42.42	102040	35.85	41.23	42.42	209416	915640
248	252	P1	2.3	36.35	41.05	41.87	166536					1082176
249	253	P2	3.2	35.53	40.39	41.01	141344	35.93	40.71	41.42	307880	1223520
250	248	B	4.0	34.96	40.66	41.58	107232					1330752
251	249	B	2.7	35.73	40.61	41.43	117448	35.33	40.64	41.51	224680	1448200
252	250	B	2.0	36.54	41.26	42.15	138032					1586232
253	251	B	2.7	35.90	40.88	41.74	112528	36.21	41.06	41.94	250560	1698760
254	258	P1	3.6	34.98	39.91	40.56	129840					1828600
255	259	P2	2.7	35.99	40.57	41.34	144688	35.45	40.23	40.93	274528	1973288
256	254	B	4.7	34.28	40.42	41.16	75456					2048744
257	255	B	4.7	34.19	40.19	40.93	79184	34.23	40.31	41.04	154640	2127928
258	256	B	4.0	34.80	40.58	41.33	75912					2203840
259	257	B	4.0	34.82	40.27	41.06	61840	34.81	40.42	41.19	137752	2265680

260	264	I	3.0	36.12	40.66	41.34	406456					2672200
261	265	P0	3.0	35.23	40.08	40.47	216328	35.65	40.36	40.88	622784	2888528
262	260	B	2.8	35.81	41.40	42.20	128232					3016760
263	261	B	2.7	36.11	41.05	41.74	133048	35.96	41.22	41.97	261280	3149808
264	262	B	2.8	35.72	41.35	42.19	124496					124496
265	263	B	2.7	35.91	40.83	41.25	130872	35.82	41.08	41.70	255368	255368
266	270	P1	3.6	35.02	40.19	40.92	132912					388280
267	271	P2	4.2	34.47	39.86	40.36	103744	34.73	40.02	40.63	236656	492024
268	266	B	3.7	35.04	41.00	41.73	83800					575824
269	267	B	3.7	34.77	40.33	40.68	92912	34.90	40.65	41.18	176712	668736
270	268	B	3.7	34.70	40.83	41.65	107240					775976
271	269	B	3.7	34.46	40.21	40.68	116368	34.58	40.51	41.14	223608	892344
272	276	P1	2.9	35.96	40.37	41.07	164920					1057264
273	277	P2	3.1	35.55	40.09	40.67	153704	35.75	40.23	40.87	318624	1210968
274	272	B	3.5	35.59	40.47	41.21	125432					1336400
275	273	B	3.5	35.47	40.25	40.93	124224	35.53	40.36	41.07	249656	1460624
276	274	B	2.5	36.20	41.15	41.84	150248					1610872
277	275	B	2.5	36.05	40.92	41.47	146632	36.12	41.03	41.65	296880	1757504
278	282	P1	3.3	35.11	39.86	40.46	151616					1909120
279	283	P2	3.3	35.23	40.09	40.69	151936	35.17	39.98	40.57	303552	2061056
280	278	B	2.5	36.28	41.19	41.97	132840					2193896
281	279	B	2.5	36.11	40.94	41.59	145328	36.20	41.06	41.78	278168	2339224
282	280	B	3.5	35.68	40.50	41.44	111872					2451096
283	281	B	3.2	35.26	40.38	41.02	111112	35.47	40.44	41.22	222984	2562208
284	288	I	3.1	36.14	40.59	41.21	413888					2976160
285	289	P0	3.0	35.34	39.98	40.49	229576	35.72	40.27	40.83	643464	3205736
286	284	B	3.2	35.33	40.73	41.46	121856					3327592
287	285	B	3.7	35.14	40.37	41.01	109200	35.23	40.54	41.23	231056	3436792
288	286	B	3.2	35.44	40.83	41.66	112928					112928
289	287	B	3.5	35.37	40.34	41.10	116232	35.41	40.58	41.37	229160	229160
290	294	P1	3.7	35.12	39.89	40.97	146872					376032
291	295	P2	3.4	35.12	40.02	40.64	136008	35.12	39.95	40.80	282880	512040
292	290	B	3.5	35.00	40.78	41.66	114928					626968
293	291	B	3.5	34.91	40.34	40.92	118280	34.96	40.56	41.27	233208	745248
294	292	B	3.8	34.77	40.38	41.22	110656					855904
295	293	B	3.8	34.72	40.07	40.62	106960	34.74	40.22	40.91	217616	962864
296	298	P1	3.3	35.24	39.94	40.86	158000					1120864
297	299	P2	3.6	34.93	39.76	40.54	130536	35.08	39.85	40.70	288536	1251400
298	296	B	3.5	35.01	40.37	41.21	112376					1363776
299	297	B	3.5	35.02	40.39	41.02	122992	35.02	40.38	41.11	235368	1486768

Mobile and Calender : 9.0000 Mbits/sec : Results averaged over sequence

Total : 300 pictures

SNR for luminance		32.42 dB
SNR for chrominance (Cb)		36.29 dB
SNR for chrominance (Cr)		36.86 dB
Number of bits		
Coefficients	Y	31331546 bits
	Cb	4104093 bits
	Cr	4070068 bits
	total	39505705 bits
Motion vectors		2934311 bits
Overhead		2535896 bits
TOTAL		44975912 bits
Mean value of Q scale		5.90

I-picture : 13 pictures

SNR for luminance		36.42 dB
SNR for chrominance (Cb)		38.04 dB
SNR for chrominance (Cr)		38.52 dB
Number of bits		
Coefficients	Y	6553006 bits
	Cb	1417127 bits
	Cr	1493696 bits
	total	9463829 bits
Motion vectors		0 bits
Overhead		52139 bits
TOTAL		9515968 bits
Mean value of Q scale		1.94

B-picture : 198 pictures

SNR for luminance		31.69 dB
SNR for chrominance (Cb)		36.11 dB
SNR for chrominance (Cr)		36.67 dB
Number of bits		
Coefficients	Y	7152122 bits
	Cb	593143 bits
	Cr	413176 bits
	total	8158441 bits
Motion vectors		2063884 bits
Overhead		1558195 bits
TOTAL		11780520 bits
Mean value of Q scale		7.19

P0-picture : 13 pictures

SNR for luminance		37.49 dB
SNR for chrominance (Cb)		37.75 dB
SNR for chrominance (Cr)		38.36 dB
Number of bits		
Coefficients	Y	5991524 bits
	Cb	779808 bits
	Cr	923139 bits
	total	7694471 bits
Motion vectors		87462 bits
Overhead		126043 bits
TOTAL		7907976 bits
Mean value of Q scale		2.01

P1-picture : 38 pictures

SNR for luminance		33.77 dB
SNR for chrominance (Cb)		36.46 dB
SNR for chrominance (Cr)		37.05 dB
Number of bits		
Coefficients	Y	6239587 bits
	Cb	760056 bits
	Cr	700519 bits
	total	7700162 bits
Motion vectors		385183 bits
Overhead		344151 bits
TOTAL		8429496 bits
Mean value of Q scale		3.79

P2-picture : 38 pictures

SNR for luminance		33.56 dB
SNR for chrominance (Cb)		36.20 dB
SNR for chrominance (Cr)		36.80 dB
Number of bits		
Coefficients	Y	5395307 bits
	Cb	553959 bits
	Cr	539536 bits
	total	6488802 bits
Motion vectors		397782 bits
Overhead		454408 bits
TOTAL		7340992 bits
Mean value of Q scale		4.01

Mobile and Calender : 9.0000 Mbits/sec : Statistics of each field and frame

				field statistics				frame statistics				cumulative
COD	INP	T	Qsc	SN-Y	SN-Cb	SN-Cr	bits	SN-Y	SN-Cb	SN-Cr	bits	bit count
0	0	I	1.2	37.61	38.96	39.47	784960					785120
1	1	P0	1.0	39.76	39.77	40.22	788008	38.55	39.35	39.83	1572968	1573128
2	6	P1	4.2	33.45	37.57	38.33	221248					1794376
3	7	P2	4.9	32.73	36.92	37.65	170248	33.07	37.23	37.98	391496	1964624
4	2	B	9.7	30.41	36.63	37.34	52024					2016648
5	3	B	8.0	31.62	37.42	38.07	52496	30.97	37.01	37.69	104520	2069144
6	4	B	8.0	31.22	36.81	37.52	54720					2123864
7	5	B	9.3	30.46	36.70	37.30	52976	30.82	36.75	37.41	107696	2176840
8	12	P1	4.5	32.84	36.47	37.16	207048					2383888
9	13	P2	4.6	32.74	36.35	37.04	196400	32.79	36.41	37.10	403448	2580288
10	8	B	9.7	30.36	35.96	36.65	51008					2631296
11	9	B	8.0	30.89	36.27	36.90	59472	30.61	36.11	36.78	110480	2690768
12	10	B	8.7	30.66	35.97	36.62	50776					2741544
13	11	B	9.7	30.16	35.95	36.56	52464	30.40	35.96	36.59	103240	2794008
14	18	P1	5.0	32.45	35.79	36.44	195464					2989472
15	19	P2	4.6	32.61	35.92	36.56	182872	32.53	35.86	36.50	378336	3172344
16	14	B	9.7	29.79	35.30	35.95	55928					3228272
17	15	B	9.0	30.35	35.47	36.09	51704	30.06	35.38	36.02	107632	3279976
18	16	B	9.0	30.49	35.44	36.07	54312					3334288
19	17	B	10.0	29.95	35.34	36.00	49808	30.21	35.39	36.03	104120	3384096
20	24	I	1.9	36.51	38.19	38.70	722120					4106280
21	25	P0	2.0	37.63	37.89	38.50	585256	37.03	38.04	38.60	1307376	4691536
22	20	B	9.0	30.51	36.16	36.78	53616					4745152
23	21	B	9.0	30.79	36.14	36.76	47640	30.65	36.15	36.77	101256	4792792
24	22	B	9.0	30.88	36.58	37.16	46536					46536
25	23	B	9.0	30.72	36.26	36.97	52464	30.80	36.41	37.06	99000	99000
26	30	P1	3.2	34.66	37.34	37.98	233120					332120
27	31	P2	3.7	33.92	36.68	37.38	195328	34.28	37.00	37.67	428448	527448
28	26	B	7.0	31.56	36.82	37.44	65864					593312
29	27	B	6.7	31.85	36.52	37.15	66112	31.70	36.67	37.29	131976	659424
30	28	B	6.7	31.58	36.42	37.18	67720					727144
31	29	B	7.0	31.47	36.11	36.79	64824	31.53	36.26	36.98	132544	791968
32	36	P1	3.5	34.14	36.71	37.41	219648					1011616
33	37	P2	3.8	33.80	36.37	37.01	215288	33.96	36.53	37.20	434936	1226904
34	32	B	7.0	32.18	36.03	36.75	45248					1272152
35	33	B	7.0	31.71	35.81	36.50	55416	31.94	35.92	36.62	100664	1327568
36	34	B	7.0	31.82	36.13	36.89	54608					1382176
37	35	B	7.0	32.36	36.07	36.74	46744	32.09	36.10	36.82	101352	1428920
38	42	P1	3.4	34.23	36.42	37.13	254368					1683288
39	43	P2	3.1	34.62	36.43	37.14	264656	34.42	36.42	37.13	519024	1947944
40	38	B	6.0	32.19	35.86	36.55	66912					2014856
41	39	B	6.0	32.12	35.76	36.43	71736	32.15	35.81	36.49	138648	2086592
42	40	B	7.0	31.82	35.97	36.55	59312					2145904
43	41	B	6.7	31.99	35.88	36.61	53336	31.90	35.92	36.58	112648	2199240
44	48	I	2.0	36.35	38.15	38.55	719400					2918704
45	49	P0	2.0	37.72	37.88	38.46	598920	36.98	38.01	38.51	1318320	3517624
46	44	B	5.7	33.04	36.96	37.53	64560					3582184
47	45	B	6.7	32.58	36.45	37.05	58240	32.80	36.70	37.28	122800	3640424
48	46	B	6.0	32.60	36.66	37.35	65040					65040
49	47	B	5.0	33.24	36.55	37.29	76728	32.91	36.61	37.32	141768	141768
50	54	P1	3.7	33.99	36.71	37.27	223216					364984
51	55	P2	3.7	33.99	36.54	37.09	201192	33.99	36.63	37.18	424408	566176
52	50	B	7.0	32.70	36.66	37.21	44952					611128
53	51	B	7.0	32.79	36.19	36.79	46880	32.74	36.42	37.00	91832	658008
54	52	B	7.0	32.51	36.96	37.52	51136					709144
55	53	B	7.0	32.54	36.51	37.12	46080	32.53	36.73	37.32	97216	755224
56	60	P1	3.4	34.27	36.26	36.91	249008					1004232
57	61	P2	3.6	33.99	36.14	36.72	221544	34.13	36.20	36.82	470552	1225776
58	56	B	6.0	32.71	36.03	36.67	56392					1282168
59	57	B	6.0	32.26	35.70	36.30	65920	32.48	35.86	36.48	122312	1348088
60	58	B	6.0	32.63	36.71	37.22	57520					1405608
61	59	B	6.0	32.64	36.33	36.90	52512	32.63	36.52	37.06	110032	1458120
62	66	P1	3.0	34.69	36.64	37.10	234056					1692176
63	67	P2	3.2	34.45	36.49	37.00	213456	34.57	36.56	37.05	447512	1905632
64	62	B	7.0	31.18	36.51	36.81	71296					1976928
65	63	B	7.0	31.20	36.34	36.71	70824	31.19	36.43	36.76	142120	2047752
66	64	B	7.0	31.27	36.13	36.68	68768					2116520
67	65	B	7.0	31.14	35.86	36.50	67752	31.20	36.00	36.59	136520	2184272
68	72	I	1.8	36.66	38.30	38.83	744008					2928344
69	73	P0	2.0	37.72	37.85	38.40	605728	37.16	38.07	38.61	1349736	3534072
70	68	B	7.0	31.39	36.61	37.10	68448					3602520
71	69	B	7.0	31.42	36.42	36.95	70168	31.41	36.51	37.02	138616	3672688
72	70	B	7.0	31.56	36.76	37.34	69184					69184
73	71	B	7.0	31.58	36.51	37.15	64696	31.57	36.63	37.24	133880	133880
74	78	P1	3.1	34.50	37.37	37.86	205784					339664
75	79	P2	3.4	34.64	37.21	37.79	184440	34.57	37.29	37.83	390224	524104
76	74	B	7.0	31.51	36.62	37.12	67616					591720
77	75	B	7.0	31.62	36.47	36.94	67200	31.57	36.54	37.03	134816	658920
78	76	B	6.7	31.62	36.83	37.32	70336					729256
79	77	B	7.0	31.49	36.44	37.01	68816	31.56	36.63	37.16	139152	798072
80	84	P1	4.4	33.14	36.55	37.08	198000					996072
81	85	P2	4.2	33.36	36.15	36.62	165728	33.25	36.35	36.84	363728	1161800
82	80	B	7.0	31.97	36.21	36.75	56288					1218088
83	81	B	7.0	31.85	35.80	36.33	62104	31.91	36.00	36.53	118392	1280192
84	82	B	7.0	32.24	36.56	37.10	59176					1339368
85	83	B	7.0	32.38	36.28	36.82	53632	32.31	36.42	36.96	112808	1393000
86	90	P1	4.1	33.37	36.10	36.58	225360					1618360
87	91	P2	4.6	32.77	35.69	36.29	178080	33.06	35.89	36.43	403440	1796440
88	86	B	8.0	31.02	35.62	36.06	57600					1854040
89	87	B	8.0	31.03	35.29	35.76	57000	31.03	35.45	35.91	114600	1911040
90	88	B	8.0	30.88	36.15	36.55	56336					1967376
91	89	B	8.0	30.95	35.82	36.30	52416	30.91	35.98	36.43	108752	2019792
92	96	I	1.7	36.88	38.48	38.85	755536					2775392
93	97	P0	2.0	37.67	37.82	38.45	603792	37.26	38.14	38.65	1359328	3379184
94	92	B	8.0	31.18	36.36	36.79	53920					3433104
95	93	B	8.0	31.32	36.23	36.65	54336	31.25	36.29	36.72	108256	3487440
96	94	B	8.0	31.31	36.86	37.21	53336					53336
97	95	B	8.0	31.27	36.44	36.87	49672	31.29	36.64	37.04	103008	103008
98	102	P1	3.2	34.57	37.26	37.81	251000					354008
99	103	P2	3.7	33.77	36.57	37.22	205120	34.15	36.90	37.50	456120	559128
100	98	B	6.0	32.52	36.80	37.34	64288					623416
101	99	B	6.0	32.58	36.40	36.96	59496	32.55	36.59	37.15	123784	682912
102	100	B	6.0	32.53	36.96	37.43	59240					742152
103	101	B	6.0	32.51	36.68	37.24	63056	32.52	36.82	37.33	122296	805208
104	108	P1	3.8	33.79	36.50	37.05	231384					1036592
105	109	P2	3.7	33.83	36.20	36.83	217728	33.81	36.35	36.94	449112	1254320
106	104	B	7.0	31.58	35.97	36.51	65816					1320136
107	105	B	7.0	31.86	35.95	36.53	59056	31.72	35.96	36.52	124872	1379192
108	106	B	7.0	32.18	36.44	36.89	54504					1433696
109	107	B	7.0	31.42	36.07	36.64	67104	31.78	36.25	36.76	121608	1500800
110	114	P1	3.8	33.69	36.22	36.80	228512					1729312
111	115	P2	4.2	33.18	35.99	36.54	207800	33.43	36.10	36.66	436312	1937112
112	110	B	7.0	31.28	35.71	36.27	67496					2004608
113	111	B	7.0	31.41	35.67	36.23	67456	31.35	35.69	36.25	134952	2072064
114	112	B	7.0	31.52	35.85	36.35	65152					2137216
115	113	B	8.0	30.79	35.52	36.09	62472	31.14	35.68	36.22	127624	2199688
116	120	I	1.6	37.03	38.52	38.87	768072					2967824
117	121	P0	2.0	37.72	37.82	38.37	607552	37.36	38.15	38.62	1375624	3575376
118	116	B	7.0	31.65	36.50	37.02	66928					3642304
119	117	B	7.0	31.62	36.22	36.74	66344	31.63	36.36	36.88	133272	3708648
120	118	B	7.0	31.57	36.68	37.22	68208					68208
121	119	B	7.0	31.52	36.31	36.91	62400	31.55	36.49	37.06	130608	130608
122	126	P1	4.2	33.28	36.72	37.21	199040					329648
123	127	P2	3.8	33.93	36.72	37.43	200840	33.60	36.72	37.32	399880	530488
124	122	B	7.0	31.43	36.54	37.12	65600					596288
125	123	B	7.7	31.28	36.16	36.63	60704	31.35	36.35	36.87	126504	656992
126	124	B	7.7	31.18	36.42	36.87	62016					719008
127	125	B	7.0	31.53	36.24	36.88	64792	31.36	36.33	36.88	126808	783800

128	132	P1	4.7	32.72	35.91	36.60	204592					988392
129	133	P2	4.7	32.67	35.96	36.54	169152	32.69	35.94	36.57	373744	1157544
130	128	B	9.0	30.59	35.53	36.19	48440					1205984
131	129	B	9.0	30.54	35.66	36.25	52272	30.57	35.59	36.22	100712	1258256
132	130	B	9.0	30.40	35.54	36.05	51848					1310104
133	131	B	9.0	30.48	35.62	36.18	49480	30.44	35.58	36.11	101328	1359584
134	138	P1	3.9	33.55	35.94	36.63	256568					1616152
135	139	P2	4.2	33.15	35.76	36.37	204976	33.35	35.85	36.50	461544	1821128
136	134	B	7.0	31.03	35.34	36.00	76208					1897336
137	135	B	7.7	30.71	35.26	35.86	66824	30.87	35.30	35.93	143032	1964160
138	136	B	7.7	30.75	35.40	35.92	65648					2029808
139	137	B	8.0	30.56	35.26	35.85	59968	30.65	35.33	35.89	125616	2089776
140	144	I	1.4	37.20	38.63	39.01	788760					2878600
141	145	P0	1.1	39.68	39.58	39.93	816472	38.27	39.08	39.44	1605232	3695072
142	140	B	8.0	31.19	36.38	36.90	59008					3754080
143	141	B	7.7	31.21	36.21	36.71	60568	31.20	36.29	36.80	119576	3814648
144	142	B	7.7	31.38	36.64	37.23	59080					59080
145	143	B	8.0	31.21	36.33	36.90	59192	31.29	36.48	37.06	118272	118272
146	150	P1	4.7	32.87	36.55	36.96	198528					316800
147	151	P2	4.6	33.08	36.55	37.02	178952	32.97	36.55	36.99	377480	495752
148	146	B	9.0	30.60	36.37	36.93	56752					552504
149	147	B	9.0	31.02	36.62	37.07	53120	30.81	36.49	37.00	109872	605624
150	148	B	9.0	30.93	36.25	36.66	54024					659648
151	149	B	9.0	30.74	36.27	36.87	56104	30.83	36.26	36.76	110128	715752
152	156	P1	5.0	32.48	35.84	36.43	197312					913064
153	157	P2	5.2	32.28	35.79	36.29	154440	32.38	35.82	36.36	351752	1067504
154	152	B	9.7	29.96	35.45	35.75	57424					1124928
155	153	B	9.0	30.63	35.58	36.04	53896	30.29	35.52	35.89	111320	1178824
156	154	B	9.0	30.42	35.44	35.83	54080					1232904
157	155	B	9.0	30.41	35.49	36.01	53912	30.42	35.47	35.92	107992	1286816
158	162	P1	4.9	32.26	35.37	35.96	195240					1482056
159	163	P2	5.3	31.92	35.15	35.79	154792	32.09	35.26	35.87	350032	1636848
160	158	B	9.0	30.25	35.16	35.71	55928					1692776
161	159	B	9.0	30.66	35.18	35.75	50112	30.45	35.17	35.73	106040	1742888
162	160	B	9.0	30.72	34.98	35.48	43632					1786520
163	161	B	9.0	30.30	34.83	35.42	48552	30.51	34.90	35.45	92184	1835072
164	168	I	2.0	36.29	37.91	38.41	727000					2562136
165	169	P0	2.0	37.69	37.71	38.27	604096	36.93	37.81	38.34	1331096	3166232
166	164	B	9.0	30.97	35.94	36.46	43296					3209528
167	165	B	9.0	31.23	36.24	36.68	40256	31.10	36.09	36.57	83552	3249784
168	166	B	9.0	31.34	36.60	37.03	38808					38808
169	167	B	9.0	30.62	36.23	36.78	43984	30.96	36.41	36.91	82792	82792
170	174	P1	2.7	35.06	37.37	37.99	264648					347440
171	175	P2	3.1	34.80	36.98	37.59	212912	34.92	37.17	37.79	477560	560352
172	170	B	7.0	31.54	36.35	36.90	65480					625832
173	171	B	5.7	32.42	36.62	37.24	69248	31.96	36.48	37.07	134728	695080
174	172	B	6.0	32.27	36.54	37.11	65568					760648
175	173	B	7.0	31.64	36.08	36.52	67456	31.94	36.30	36.80	133024	828104
176	180	P1	3.7	33.82	36.46	37.04	231960					1060064
177	181	P2	3.6	33.98	36.28	36.79	203032	33.90	36.37	36.91	434992	1263096
178	176	B	7.0	31.53	36.43	36.97	68856					1331952
179	177	B	7.0	31.88	36.30	36.86	62752	31.70	36.36	36.92	131608	1394704
180	178	B	7.0	31.76	36.25	36.80	62696					1457400
181	179	B	7.7	31.19	35.89	36.40	61720	31.47	36.07	36.60	124416	1519120
182	186	P1	4.3	33.19	35.68	36.35	233776					1752896
183	187	P2	4.5	32.90	35.50	36.09	188776	33.04	35.59	36.22	422552	1941672
184	182	B	8.0	30.76	35.61	36.07	62040					2003712
185	183	B	8.0	30.99	35.46	35.93	59816	30.87	35.54	36.00	121856	2063528
186	184	B	8.0	30.98	35.45	35.98	57408					2120936
187	185	B	8.0	30.71	35.14	35.72	62080	30.84	35.29	35.85	119488	2183016
188	192	I	2.0	36.33	37.95	38.38	734200					2917280
189	193	P0	2.0	37.69	37.68	38.19	607560	36.96	37.81	38.28	1341760	3524840
190	188	B	8.0	31.49	36.39	36.90	56064					3580904
191	189	B	8.0	32.23	36.53	36.96	49912	31.84	36.46	36.93	105976	3630816
192	190	B	8.0	32.03	36.64	37.14	48128					48128
193	191	B	8.0	32.33	36.48	36.92	44856	32.17	36.56	37.03	92984	92984

194	198	P1	3.0	34.77	37.20	37.68	253760					346744
195	199	P2	3.4	34.30	36.74	37.18	197616	34.53	36.96	37.42	451376	544360
196	194	B	5.0	33.73	37.13	37.65	77064					621424
197	195	B	5.0	34.00	36.77	37.33	72992	33.86	36.95	37.49	150056	694416
198	196	B	5.0	33.70	37.00	37.46	75672					770088
199	197	B	5.0	33.92	36.76	37.24	76048	33.81	36.88	37.35	151720	846136
200	204	P1	3.9	33.66	36.29	36.83	211992					1058128
201	205	P2	4.1	33.49	36.00	36.51	185280	33.57	36.15	36.66	397272	1243408
202	200	B	7.0	32.82	36.24	36.67	49024					1292432
203	201	B	7.0	32.80	35.92	36.34	51200	32.81	36.08	36.50	100224	1343632
204	202	B	7.0	32.49	36.02	36.48	50192					1393824
205	203	B	7.0	32.48	35.74	36.20	47368	32.48	35.88	36.34	97560	1441192
206	210	P1	3.3	34.39	36.34	36.92	260960					1702152
207	211	P2	3.6	34.08	36.02	36.61	227960	34.23	36.18	36.76	488920	1930112
208	206	B	6.0	33.06	35.87	36.39	55080					1985192
209	207	B	6.0	32.75	35.68	36.17	62728	32.90	35.77	36.28	117808	2047920
210	208	B	6.0	32.94	35.83	36.34	61472					2109392
211	209	B	6.0	32.81	35.63	36.20	60488	32.88	35.73	36.27	121960	2169880
212	216	I	2.0	36.38	37.95	38.37	726320					2896264
213	217	P0	2.0	37.65	37.68	38.25	595992	36.97	37.81	38.31	1322312	3492256
214	212	B	6.0	32.52	36.52	36.95	63432					3555688
215	213	B	6.0	32.19	36.50	37.06	73904	32.35	36.51	37.00	137336	3629592
216	214	B	6.0	32.35	36.96	37.43	72616					72616
217	215	B	6.0	32.45	36.55	37.03	66000	32.40	36.75	37.22	138616	138616
218	222	P1	3.9	33.88	36.42	36.93	224560					363176
219	223	P2	3.9	33.90	36.22	36.65	196480	33.89	36.32	36.79	421040	559656
220	218	B	7.0	31.58	36.78	37.16	59736					619392
221	219	B	7.0	31.81	36.59	37.05	59448	31.69	36.69	37.11	119184	678840
222	220	B	7.0	31.53	36.45	36.85	61288					740128
223	221	B	7.0	31.70	35.96	36.36	57536	31.61	36.20	36.60	118824	797664
224	228	P1	3.8	33.79	36.25	36.92	232928					1030592
225	229	P2	3.9	33.83	36.41	36.93	184192	33.81	36.33	36.93	417120	1214784
226	224	B	7.0	31.41	35.89	36.38	67424					1282208
227	225	B	7.0	31.51	35.90	36.36	62848	31.46	35.90	36.37	130272	1345056
228	226	B	7.0	31.32	35.78	36.32	66448					1411504
229	227	B	7.0	31.08	35.42	35.92	67800	31.20	35.59	36.12	134248	1479304
230	234	P1	3.5	34.30	36.43	36.96	225656					1704960
231	235	P2	4.2	33.52	36.02	36.45	165864	33.89	36.22	36.70	391520	1870824
232	230	B	6.0	31.97	35.49	36.07	80528					1951352
233	231	B	6.0	32.18	35.47	35.97	72272	32.07	35.48	36.02	152800	2023624
234	232	B	6.0	31.81	35.95	36.49	80072					2103696
235	233	B	7.7	31.05	35.57	36.07	59400	31.42	35.76	36.27	139472	2163096
236	240	I	1.8	36.64	38.08	38.57	736592					2899752
237	241	P0	2.0	37.66	37.78	38.39	580352	37.12	37.93	38.48	1316944	3480104
238	236	B	6.0	33.30	36.62	37.12	56712					3536816
239	237	B	6.0	33.11	36.17	36.66	64664	33.21	36.39	36.88	121376	3601480
240	238	B	6.0	33.36	36.51	37.14	57208					57208
241	239	B	6.0	33.19	36.23	36.91	53440	33.28	36.37	37.02	110648	110648
242	246	P1	3.0	34.91	37.29	37.90	224360					335008
243	247	P2	3.0	35.30	37.08	37.66	200224	35.10	37.18	37.78	424584	535232
244	242	B	7.0	31.74	36.32	36.84	67944					603176
245	243	B	6.3	32.16	36.00	36.59	72272	31.94	36.16	36.72	140216	675448
246	244	B	6.0	32.39	36.50	37.03	71680					747128
247	245	B	6.7	32.16	36.23	36.76	63064	32.27	36.36	36.89	134744	810192
248	252	P1	3.5	34.31	36.59	37.25	220848					1031040
249	253	P2	4.1	33.69	36.10	36.71	171600	33.99	36.34	36.97	392448	1202640
250	248	B	7.0	31.69	35.76	36.42	63960					1266600
251	249	B	7.0	31.82	35.79	36.39	65680	31.75	35.78	36.40	129640	1332280
252	250	B	7.0	32.25	35.87	36.45	58176					1390456
253	251	B	7.0	32.25	35.67	36.24	57840	32.25	35.77	36.34	116016	1448296
254	258	P1	3.0	35.11	36.90	37.52	230560					1678856
255	259	P2	3.0	34.79	36.58	37.14	201080	34.95	36.74	37.33	431640	1879936
256	254	B	5.0	33.85	36.69	37.35	78792					1958728
257	255	B	5.0	33.60	36.43	37.03	83144	33.72	36.56	37.19	161936	2041872
258	256	B	5.0	33.78	36.70	37.34	71008					2112880
259	257	B	6.0	33.10	36.37	36.89	54224	33.42	36.53	37.11	125232	2167104

260	264	I	2.2	36.21	37.70	38.30	686744					2853912
261	265	P0	2.0	37.63	37.77	38.52	551176	36.86	37.74	38.41	1237920	3405088
262	260	B	5.2	33.82	37.39	37.99	70104					3475192
263	261	B	5.7	33.25	37.05	37.60	64880	33.52	37.22	37.79	134984	3540072
264	262	B	6.7	32.70	37.56	38.04	60288					60288
265	263	B	8.0	31.95	36.89	37.41	51232	32.31	37.21	37.71	111520	111520
266	270	P1	3.6	34.33	37.02	37.63	181456					292976
267	271	P2	3.4	34.57	36.70	37.37	167328	34.45	36.86	37.50	348784	460304
268	266	B	7.5	32.19	36.51	37.10	51256					511560
269	267	B	6.2	33.07	36.32	36.94	57376	32.61	36.41	37.02	108632	568936
270	268	B	6.8	32.32	36.49	37.13	53968					622904
271	269	B	6.2	32.89	36.48	37.20	56336	32.60	36.49	37.17	110304	679240
272	276	P1	4.2	34.09	36.41	37.11	175728					854968
273	277	P2	4.1	34.27	36.24	36.96	158088	34.18	36.33	37.04	333816	1013056
274	272	B	6.2	32.53	36.01	36.64	61592					1074648
275	273	B	6.3	32.40	35.91	36.56	60248	32.46	35.96	36.60	121840	1134896
276	274	B	6.2	32.67	36.12	36.86	63160					1198056
277	275	B	6.7	32.27	35.95	36.66	57216	32.47	36.04	36.76	120376	1255272
278	282	P1	4.2	33.33	36.06	36.61	155664					1410936
279	283	P2	5.3	32.48	35.55	36.24	131648	32.88	35.80	36.42	287312	1542584
280	278	B	6.7	32.41	36.06	36.66	51456					1594040
281	279	B	6.7	32.80	35.94	36.51	50472	32.60	36.00	36.59	101928	1644512
282	280	B	6.7	32.27	35.95	36.45	53824					1698336
283	281	B	6.7	32.39	35.83	36.44	51848	32.33	35.89	36.44	105672	1750184
284	288	I	3.7	34.26	36.29	36.94	622256					2372504
285	289	P0	4.0	34.00	35.20	36.04	363072	34.13	35.71	36.47	985328	2735576
286	284	B	6.7	32.66	36.14	36.78	49016					2784592
287	285	B	6.7	32.58	35.18	35.89	51480	32.62	35.63	36.30	100496	2836072
288	286	B	6.7	32.07	35.88	36.53	55248					55248
289	287	B	6.7	32.07	35.23	35.98	51584	32.07	35.55	36.24	106832	106832
290	294	P1	3.8	33.55	35.60	36.25	208928					315760
291	295	P2	4.7	33.22	35.30	35.97	211112	33.38	35.45	36.11	420040	526872
292	290	B	6.7	32.68	35.68	36.35	46528					573400
293	291	B	6.7	32.50	35.00	35.73	51624	32.59	35.33	36.03	98152	625024
294	292	B	6.7	32.57	35.95	36.65	49960					674984
295	293	B	6.7	32.54	35.18	35.93	48768	32.55	35.55	36.27	98728	723752
296	298	P1	3.2	34.41	35.99	36.64	263216					986968
297	299	P2	4.1	33.55	35.39	36.12	254768	33.96	35.68	36.37	517984	1241736
298	296	B	6.3	31.62	35.72	36.28	65600					1307336
299	297	B	6.5	31.30	35.18	35.84	64088	31.46	35.44	36.05	129688	1371424

Popple : 9.0000 Mbits/sec : Results averaged over sequence

Total : 300 pictures
SNR for luminance 34.69 dB
SNR for chrominance (Cb) 38.89 dB
SNR for chrominance (Cr) 39.14 dB
Number of bits
Coefficients Y 21130312 bits
Cb 6058864 bits
Cr 6996000 bits
total 34185176 bits
Motion vectors 7677068 bits
Overhead 3110884 bits
TOTAL 44973128 bits
Mean value of Q scale 5.15

I-picture : 13 pictures
SNR for luminance 36.40 dB
SNR for chrominance (Cb) 40.26 dB
SNR for chrominance (Cr) 40.35 dB
Number of bits
Coefficients Y 2460045 bits
Cb 643831 bits
Cr 749289 bits
total 3853165 bits
Motion vectors 0 bits
Overhead 52147 bits
TOTAL 3905312 bits
Mean value of Q scale 3.34

B-picture : 198 pictures
SNR for luminance 34.34 dB
SNR for chrominance (Cb) 38.59 dB
SNR for chrominance (Cr) 38.89 dB
Number of bits
Coefficients Y 9170769 bits
Cb 3125338 bits
Cr 3604832 bits
total 15900939 bits
Motion vectors 5965522 bits
Overhead 2091595 bits
TOTAL 23958056 bits
Mean value of Q scale 5.82

P0-picture : 13 pictures
SNR for luminance 35.76 dB
SNR for chrominance (Cb) 39.98 dB
SNR for chrominance (Cr) 40.05 dB
Number of bits
Coefficients Y 1780908 bits
Cb 387048 bits
Cr 448079 bits
total 2616035 bits
Motion vectors 159175 bits
Overhead 139222 bits
TOTAL 2914432 bits
Mean value of Q scale 3.31

P1-picture : 38 pictures
SNR for luminance 35.51 dB
SNR for chrominance (Cb) 39.61 dB
SNR for chrominance (Cr) 39.74 dB

Number of bits

Coefficients	Y	4651099 bits
	Cb	1179132 bits
	Cr	1339432 bits
	total	7169663 bits
Motion vectors		549485 bits
Overhead		395844 bits
TOTAL		8114992 bits
Mean value of Q scale		3.64

P2-picture : 38 pictures

SNR for luminance		35.00 dB
SNR for chrominance (Cb)		39.12 dB
SNR for chrominance (Cr)		39.29 dB
Number of bits		
Coefficients	Y	3067491 bits
	Cb	723515 bits
	Cr	854368 bits
	total	4645374 bits
Motion vectors		1002886 bits
Overhead		431116 bits
TOTAL		6079376 bits
Mean value of Q scale		4.41

Popple : 9.0000 Mbits/sec : Statistics of each field and frame

				field statistics				frame statistics				cumulative
COD	INP	T	Qsc	SN-Y	SN-Cb	SN-Cr	bits	SN-Y	SN-Cb	SN-Cr	bits	bit count
0	0	I	1.2	38.41	41.96	41.58	380696					380856
1	1	P0	1.0	39.06	42.88	42.26	395976	38.72	42.40	41.90	776672	776832
2	6	P1	2.2	37.35	41.54	41.26	245880					1022712
3	7	P2	2.5	36.67	40.97	40.88	188448	37.00	41.24	41.07	434328	1211160
4	2	B	4.0	35.49	40.82	40.81	111920					1323080
5	3	B	4.0	35.53	40.64	40.68	119432	35.51	40.73	40.75	231352	1442512
6	4	B	4.0	35.48	40.70	40.69	120216					1562728
7	5	B	4.0	35.42	40.50	40.59	110016	35.45	40.60	40.64	230232	1672744
8	12	P1	2.3	36.71	41.16	41.00	207944					1880688
9	13	P2	2.9	36.32	40.40	40.50	169424	36.51	40.76	40.74	377368	2050112
10	8	B	4.0	35.43	40.42	40.46	111144					2161256
11	9	B	4.0	35.41	40.21	40.31	118384	35.42	40.31	40.39	229528	2279640
12	10	B	4.0	35.43	40.28	40.37	117568					2397208
13	11	B	4.0	35.39	40.06	40.27	107264	35.41	40.17	40.32	224832	2504472
14	18	P1	2.7	36.36	40.77	40.60	189728					2694200
15	19	P2	3.7	35.58	39.64	39.72	144904	35.95	40.17	40.14	334632	2839104
16	14	B	5.0	34.95	39.46	39.73	79200					2918304
17	15	B	5.0	34.91	39.26	39.56	87048	34.93	39.36	39.65	166248	3005352
18	16	B	4.7	35.17	39.56	39.75	96408					3101760
19	17	B	4.0	35.64	39.66	39.82	107248	35.40	39.61	39.79	203656	3209008
20	24	I	1.9	37.52	41.14	40.92	353128					3562200
21	25	P0	2.0	37.46	41.37	41.08	276208	37.49	41.25	41.00	629336	3838408
22	20	B	4.7	35.16	39.72	39.90	91624					3930032
23	21	B	4.7	35.19	39.54	39.69	96568	35.18	39.63	39.80	188192	4026600
24	22	B	4.7	35.17	39.81	39.87	96784					96784
25	23	B	4.0	35.62	39.88	40.08	106632	35.39	39.84	39.98	203416	203416
26	30	P1	2.4	36.82	41.12	40.85	224088					427504
27	31	P2	2.8	36.39	40.32	40.32	178080	36.60	40.70	40.58	402168	605584
28	26	B	4.0	35.30	40.28	40.39	109576					715160
29	27	B	4.0	35.37	40.01	40.09	115416	35.34	40.14	40.24	224992	830576
30	28	B	4.0	35.26	40.29	40.37	115032					945608
31	29	B	4.0	35.26	39.96	40.06	105760	35.26	40.12	40.21	220792	1051368
32	36	P1	2.1	36.98	41.05	40.95	230816					1282184
33	37	P2	2.7	36.51	40.37	40.32	186328	36.73	40.69	40.62	417144	1468512
34	32	B	4.0	35.31	40.03	40.11	104400					1572912
35	33	B	4.0	35.31	39.72	39.85	113848	35.31	39.87	39.98	218248	1686760
36	34	B	4.0	35.30	39.97	40.14	114424					1801184
37	35	B	4.0	35.23	39.71	39.98	106048	35.27	39.84	40.06	220472	1907232
38	42	P1	2.0	37.14	41.45	41.19	242880					2150112
39	43	P2	2.3	36.90	40.84	40.66	205392	37.02	41.14	40.92	448272	2355504
40	38	B	4.0	35.35	40.06	40.16	107008					2462512
41	39	B	4.0	35.32	39.92	40.02	114624	35.34	39.99	40.09	221632	2577136
42	40	B	4.0	35.32	40.13	40.24	113656					2690792
43	41	B	3.3	35.74	40.17	40.20	119896	35.52	40.15	40.22	233552	2810688
44	48	I	2.1	37.34	41.09	40.87	325832					3136584
45	49	P0	2.0	37.47	41.51	41.24	261296	37.40	41.30	41.05	587128	3397880
46	44	B	4.0	35.35	40.39	40.46	105552					3503432
47	45	B	4.0	35.37	40.31	40.31	114040	35.36	40.35	40.38	219592	3617472
48	46	B	4.0	35.41	40.50	40.60	116688					116688
49	47	B	4.0	35.45	40.31	40.46	106064	35.43	40.40	40.53	222752	222752
50	54	P1	2.1	37.26	41.44	41.31	238288					461040
51	55	P2	2.7	36.64	40.72	40.64	186552	36.94	41.07	40.96	424840	647592
52	50	B	4.0	35.44	40.48	40.61	104976					752568
53	51	B	4.0	35.52	40.40	40.31	115880	35.48	40.44	40.46	220856	868448
54	52	B	4.0	35.46	40.50	40.54	117760					986208
55	53	B	4.0	35.40	40.29	40.31	107872	35.43	40.39	40.42	225632	1094080
56	60	P1	2.2	36.97	41.34	41.16	224576					1318656
57	61	P2	2.5	36.74	40.97	40.78	189440	36.86	41.15	40.97	414016	1508096
58	56	B	4.0	35.44	40.33	40.39	107864					1615960
59	57	B	4.0	35.44	40.24	40.18	117912	35.44	40.29	40.29	225776	1733872
60	58	B	4.0	35.39	40.30	40.43	117248					1851120
61	59	B	4.0	35.40	40.21	40.40	104952	35.39	40.25	40.42	222200	1956072

62	66	P1	2.2	36.97	41.39	41.19	224784					2180856
63	67	P2	2.9	36.52	40.51	40.51	178344	36.74	40.93	40.84	403128	2359200
64	62	B	4.0	35.45	40.32	40.38	108624					2467824
65	63	B	4.0	35.39	40.18	40.29	116864	35.42	40.25	40.34	225488	2584688
66	64	B	4.0	35.41	40.35	40.43	114584					2699272
67	65	B	4.0	35.43	40.15	40.27	103952	35.42	40.25	40.35	218536	2803224
68	72	I	2.3	37.08	40.90	40.80	314688					3117976
69	73	P0	2.0	37.49	41.57	41.27	259392	37.28	41.22	41.03	574080	3377368
70	68	B	4.0	35.41	40.58	40.75	108304					3485672
71	69	B	4.0	35.43	40.40	40.55	115256	35.42	40.49	40.65	223560	3600928
72	70	B	4.0	35.35	40.65	40.76	115368					115368
73	71	B	4.0	35.39	40.43	40.62	106032	35.37	40.54	40.69	221400	221400
74	78	P1	2.3	36.98	40.93	40.97	226512					447912
75	79	P2	2.9	36.53	40.42	40.46	176448	36.75	40.67	40.71	402960	624360
76	74	B	4.0	35.38	40.33	40.55	108184					732544
77	75	B	4.0	35.45	40.26	40.42	113104	35.41	40.30	40.49	221288	845648
78	76	B	4.0	35.36	40.28	40.50	112840					958488
79	77	B	4.0	35.36	40.16	40.36	105408	35.36	40.22	40.43	218248	1063896
80	84	P1	2.2	36.89	40.94	41.02	228152					1292048
81	85	P2	2.7	36.55	40.54	40.45	182816	36.72	40.74	40.73	410968	1474864
82	80	B	4.0	35.40	40.00	40.39	103224					1578088
83	81	B	4.0	35.42	40.05	40.24	110176	35.41	40.02	40.32	213400	1688264
84	82	B	4.0	35.32	39.99	40.34	109176					1797440
85	83	B	4.0	35.29	39.92	40.21	102944	35.30	39.95	40.27	212120	1900384
86	90	P1	2.1	37.09	40.96	40.99	237152					2137536
87	91	P2	2.4	36.77	40.51	40.49	195120	36.93	40.73	40.74	432272	2332656
88	86	B	4.0	35.34	39.95	40.28	102472					2435128
89	87	B	4.0	35.37	39.94	40.16	111040	35.35	39.94	40.22	213512	2546168
90	88	B	4.0	35.30	39.90	40.30	111224					2657392
91	89	B	3.0	36.16	40.14	40.26	130048	35.71	40.02	40.28	241272	2787440
92	96	I	2.5	37.04	40.73	40.68	321752					3109256
93	97	P0	2.0	37.47	41.39	41.10	263568	37.25	41.05	40.88	585320	3372824
94	92	B	4.0	35.37	40.24	40.46	104152					3476976
95	93	B	4.0	35.45	40.15	40.34	112240	35.41	40.19	40.40	216392	3589216
96	94	B	4.0	35.44	40.35	40.57	112880					112880
97	95	B	4.0	35.47	40.18	40.36	103672	35.45	40.27	40.46	216552	216552
98	102	P1	2.2	37.02	41.37	41.17	233592					450144
99	103	P2	2.6	36.66	40.58	40.60	186624	36.84	40.96	40.88	420216	636768
100	98	B	4.0	35.42	40.37	40.46	105656					742424
101	99	B	4.0	35.38	40.23	40.33	112320	35.40	40.30	40.39	217976	854744
102	100	B	4.0	35.39	40.33	40.47	111648					966392
103	101	B	4.0	35.34	40.06	40.33	101696	35.36	40.19	40.40	213344	1068088
104	108	P1	2.1	37.00	41.11	41.13	233448					1301536
105	109	P2	2.4	36.82	40.58	40.61	198232	36.91	40.84	40.86	431680	1499768
106	104	B	4.0	35.25	40.07	40.24	113184					1612952
107	105	B	4.0	35.18	39.92	40.14	117984	35.22	39.99	40.19	231168	1730936
108	106	B	4.0	35.31	40.04	40.22	122472					1853408
109	107	B	4.0	35.25	39.90	40.14	113384	35.28	39.97	40.18	235856	1966792
110	114	P1	2.3	36.82	40.89	40.88	222344					2189136
111	115	P2	3.0	36.31	40.31	40.25	172656	36.56	40.59	40.55	395000	2361792
112	110	B	4.0	35.27	39.90	40.10	111344					2473136
113	111	B	4.0	35.28	39.79	39.98	124416	35.28	39.84	40.04	235760	2597552
114	112	B	4.0	35.26	40.01	40.20	119264					2716816
115	113	B	4.0	35.25	39.90	40.04	110896	35.25	39.95	40.12	230160	2827712
116	120	I	2.6	36.99	40.87	40.78	291176					3118952
117	121	P0	3.0	36.28	40.23	40.24	180272	36.62	40.54	40.50	471448	3299224
118	116	B	4.0	35.34	40.33	40.44	116344					3415568
119	117	B	4.0	35.31	40.23	40.15	122536	35.33	40.28	40.29	238880	3538104
120	118	B	4.0	35.42	40.59	40.58	122768					122768
121	119	B	4.0	35.36	40.23	40.33	107080	35.39	40.41	40.45	229848	229848
122	126	P1	2.4	37.00	40.90	40.98	225040					454888
123	127	P2	2.9	36.55	40.65	40.76	177616	36.77	40.77	40.87	402656	632504
124	122	B	4.0	35.39	40.33	40.46	115992					748496
125	123	B	4.0	35.34	39.98	40.17	130608	35.36	40.15	40.31	246600	879104
126	124	B	4.0	35.37	40.26	40.44	126872					1005976
127	125	B	4.0	35.33	40.04	40.26	123160	35.35	40.15	40.35	250032	1129136
128	132	P1	2.2	37.02	41.62	41.50	223000					1352136
129	133	P2	3.0	36.50	40.80	40.81	164512	36.75	41.19	41.14	387512	1516648
130	128	B	4.0	35.35	40.08	40.42	116824					1633472
131	129	B	4.0	35.52	40.24	40.45	121216	35.44	40.16	40.44	238040	1754688
132	130	B	4.0	35.45	40.16	40.57	120224					1874912
133	131	B	3.0	36.03	40.43	40.69	133136	35.73	40.29	40.63	253360	2008048
134	138	P1	2.2	37.17	41.34	41.44	218600					2226648
135	139	P2	2.9	36.67	40.87	40.96	161440	36.91	41.10	41.19	380040	2388088
136	134	B	4.0	35.43	40.12	40.55	115504					2503592
137	135	B	4.0	35.46	40.12	40.58	126392	35.44	40.12	40.56	241896	2629984
138	136	B	4.0	35.48	40.19	40.61	122392					2752376
139	137	B	4.0	35.55	40.26	40.63	111488	35.52	40.23	40.62	233880	2863864
140	144	I	2.1	37.51	41.45	41.31	287872					3151800
141	145	P0	2.0	37.33	42.06	41.89	198456	37.42	41.75	41.59	486328	3350256
142	140	B	3.7	35.97	40.46	40.77	124088					3474344
143	141	B	4.0	35.68	40.49	40.77	120184	35.82	40.47	40.77	244272	3594528
144	142	B	4.0	35.65	40.63	40.81	123856					123856
145	143	B	3.3	36.12	40.96	41.12	126840	35.88	40.79	40.96	250696	250696
146	150	P1	2.3	37.13	41.77	41.65	211352					462048
147	151	P2	2.8	36.80	41.36	41.26	151680	36.96	41.56	41.45	363032	613728
148	146	B	3.3	36.21	41.11	41.17	119976					733704
149	147	B	3.0	35.92	40.96	40.95	118536	36.06	41.03	41.06	238512	852240
150	148	B	4.0	36.03	40.94	41.01	121008					973248
151	149	B	3.0	36.55	41.37	41.26	127192	36.29	41.15	41.13	248200	1100440
152	156	P1	2.2	37.38	42.37	41.87	223224					1323664
153	157	P2	2.5	37.13	41.87	41.56	155312	37.25	42.11	41.71	378536	1478976
154	152	B	3.3	36.52	41.26	41.22	120680					1599656
155	153	B	3.7	36.39	41.13	41.08	123384	36.45	41.20	41.15	244064	1723040
156	154	B	3.3	36.61	41.58	41.27	130248					1853288
157	155	B	2.7	36.90	41.79	41.45	132320	36.75	41.68	41.36	262568	1985608
158	162	P1	1.8	37.61	42.68	42.19	237464					2223072
159	163	P2	2.9	36.80	41.68	41.39	139360	37.18	42.15	41.77	376824	2362432
160	158	B	3.0	36.74	41.68	41.28	123176					2485608
161	159	B	3.3	36.62	41.58	41.24	133328	36.68	41.63	41.26	256504	2618936
162	160	B	3.3	36.60	41.54	41.30	135360					2754296
163	161	B	3.3	36.57	41.58	41.27	119328	36.58	41.56	41.28	254688	2873624
164	168	I	2.3	37.62	41.94	41.68	232840					3106528
165	169	P0	2.0	37.36	42.76	42.37	187880	37.49	42.34	42.01	420720	3294408
166	164	B	3.3	36.74	41.57	41.30	126176					3420584
167	165	B	4.0	36.47	41.17	41.02	134800	36.60	41.37	41.16	260976	3555384
168	166	B	3.0	36.43	41.39	41.11	134792					134792
169	167	B	3.0	36.80	41.78	41.49	130840	36.61	41.58	41.30	265632	265632
170	174	P1	2.4	37.19	42.24	41.84	217384					483016
171	175	P2	3.4	36.68	41.35	41.22	143448	36.93	41.77	41.52	360832	626464
172	170	B	3.0	36.81	41.68	41.47	133584					760048
173	171	B	4.0	36.53	41.28	41.15	137328	36.67	41.48	41.31	270912	897376
174	172	B	4.0	36.55	41.34	41.18	141128					1038504
175	173	B	3.3	36.80	41.73	41.48	131520	36.67	41.53	41.33	272648	1170024
176	180	P1	2.5	36.94	41.74	41.55	213192					1383216
177	181	P2	3.9	36.23	40.66	40.67	136520	36.57	41.16	41.09	349712	1519736
178	176	B	4.0	36.28	40.75	40.78	115216					1634952
179	177	B	4.7	36.03	40.37	40.39	124376	36.15	40.55	40.58	239592	1759328
180	178	B	4.7	36.04	40.38	40.47	127144					1886472
181	179	B	4.0	36.25	40.67	40.73	120832	36.15	40.52	40.60	247976	2007304
182	186	P1	2.5	36.84	41.30	41.30	231528					2238832
183	187	P2	4.0	35.92	40.27	40.46	154504	36.35	40.75	40.86	386032	2393336
184	182	B	5.0	36.14	40.38	40.68	129264					2522600
185	183	B	5.0	35.68	40.00	40.18	135768	35.90	40.19	40.41	265032	2658368
186	184	B	5.0	35.74	39.95	40.10	136360					2794728
187	185	B	4.7	35.84	40.27	40.37	122000	35.79	40.11	40.23	258360	2916728
188	192	I	2.8	37.11	41.24	41.30	277848					3194440
189	193	P0	3.0	36.07	40.68	40.86	194736	36.56	40.94	41.07	472384	3389176
190	188	B	5.0	35.36	39.65	39.96	125032					3514208
191	189	B	5.3	35.22	39.66	39.78	147352	35.29	39.65	39.87	272384	3661560
192	190	B	5.3	35.16	39.51	39.76	149848					149848
193	191	B	5.0	35.23	39.65	39.99	129216	35.19	39.58	39.87	279064	279064

194	198	P1	4.1	35.30	39.75	40.08	203472					482536
195	199	P2	4.9	34.66	39.20	39.53	154376	34.97	39.47	39.80	357848	636912
196	194	B	5.7	34.73	39.25	39.65	122424					759336
197	195	B	6.3	34.43	38.79	39.12	140584	34.58	39.01	39.38	263008	899920
198	196	B	7.0	34.06	38.41	38.83	134152					1034072
199	197	B	6.0	34.59	38.89	39.35	122768	34.32	38.64	39.08	256920	1156840
200	204	P1	4.6	34.80	38.96	39.30	199840					1356680
201	205	P2	5.5	34.18	38.34	38.77	147160	34.48	38.64	39.02	347000	1503840
202	200	B	7.7	33.61	37.96	38.28	112584					1616424
203	201	B	8.0	33.40	37.72	38.02	134744	33.50	37.84	38.15	247328	1751168
204	202	B	8.0	33.46	37.63	38.07	137816					1888984
205	203	B	7.0	33.88	37.89	38.43	118680	33.68	37.75	38.25	256496	2007664
206	210	P1	5.0	34.48	38.31	38.49	200360					2208024
207	211	P2	5.9	33.94	37.97	38.19	145288	34.20	38.14	38.34	345648	2353312
208	206	B	7.7	33.28	37.58	37.79	119848					2473160
209	207	B	8.3	33.14	37.19	37.36	139960	33.21	37.38	37.57	259808	2613120
210	208	B	9.0	32.93	36.88	37.26	132120					2745240
211	209	B	8.0	33.44	37.33	37.74	113816	33.18	37.10	37.49	245936	2859056
212	216	I	3.1	36.47	40.27	40.62	322360					3181480
213	217	P0	3.0	35.71	39.88	40.17	222216	36.07	40.07	40.39	544576	3403696
214	212	B	8.0	33.28	37.48	37.64	125016					3528712
215	213	B	9.0	32.85	36.98	37.28	139008	33.06	37.22	37.45	264024	3667720
216	214	B	9.0	33.06	36.99	37.45	135056					135056
217	215	B	8.0	33.58	37.64	38.23	117088	33.31	37.30	37.82	252144	252144
218	222	P1	5.3	34.41	38.24	38.68	194840					446984
219	223	P2	6.3	33.91	37.80	38.24	142944	34.16	38.01	38.46	337784	589928
220	218	B	8.0	33.44	37.50	38.03	124704					714632
221	219	B	9.0	33.00	36.98	37.44	140920	33.22	37.23	37.72	265624	855552
222	220	B	9.0	33.11	36.82	37.41	137880					993432
223	221	B	8.0	33.64	37.43	37.98	118952	33.37	37.11	37.68	256832	1112384
224	228	P1	5.3	34.55	38.04	38.48	192792					1305176
225	229	P2	6.5	34.00	37.70	38.13	138640	34.26	37.87	38.30	331432	1443816
226	224	B	8.0	33.39	37.16	37.63	130376					1574192
227	225	B	9.0	33.13	36.81	37.27	142640	33.26	36.98	37.44	273016	1716832
228	226	B	9.0	33.30	36.70	37.21	140112					1856944
229	227	B	8.0	33.78	37.17	37.78	122408	33.53	36.93	37.49	262520	1979352
230	234	P1	6.1	34.10	37.73	38.06	176896					2156248
231	235	P2	7.1	33.62	37.50	37.79	130232	33.85	37.62	37.92	307128	2286480
232	230	B	8.7	33.35	36.76	37.26	119360					2405840
233	231	B	9.7	33.09	36.38	37.04	133160	33.22	36.57	37.15	252520	2539000
234	232	B	9.3	33.36	36.49	37.12	136128					2675128
235	233	B	9.0	33.49	36.68	37.30	110488	33.42	36.58	37.21	246616	2785616
236	240	I	4.0	35.73	39.56	40.00	308112					3093792
237	241	P0	4.0	34.98	39.11	39.51	217696	35.34	39.33	39.75	525808	3311488
238	236	B	8.7	33.15	36.87	37.28	125336					3436824
239	237	B	10.0	32.71	36.31	36.85	141224	32.92	36.58	37.06	266560	3578048
240	238	B	9.3	33.02	36.54	37.21	141672					141672
241	239	B	8.0	33.55	37.17	37.80	125432	33.28	36.84	37.49	267104	267104
242	246	P1	6.7	33.39	37.51	37.83	181936					449040
243	247	P2	7.8	32.87	37.07	37.38	128408	33.12	37.28	37.60	310344	577448
244	242	B	10.0	32.38	36.47	36.85	113496					690944
245	243	B	11.0	32.08	35.88	36.33	130048	32.23	36.17	36.58	243544	820992
246	244	B	11.0	32.13	35.81	36.26	132064					953056
247	245	B	10.0	32.44	36.21	36.67	114112	32.28	36.00	36.46	246176	1067168
248	252	P1	6.0	33.66	37.49	37.86	197288					1264456
249	253	P2	6.6	33.20	37.30	37.63	143880	33.42	37.39	37.74	341168	1408336
250	248	B	9.0	32.42	36.43	36.80	130032					1538368
251	249	B	10.0	32.07	36.06	36.45	141536	32.24	36.24	36.62	271568	1679904
252	250	B	9.3	32.44	36.28	36.78	144144					1824048
253	251	B	8.7	32.70	36.47	37.07	124560	32.57	36.38	36.92	268704	1948608
254	258	P1	5.8	33.82	37.59	37.90	197520					2146128
255	259	P2	7.6	32.88	37.12	37.30	131952	33.32	37.35	37.59	329472	2278080
256	254	B	9.7	32.24	36.33	36.69	117408					2395488
257	255	B	10.0	32.19	36.08	36.48	142584	32.22	36.20	36.58	259992	2538072
258	256	B	10.0	32.33	36.14	36.55	139792					2677864
259	257	B	9.0	32.66	36.52	37.00	121600	32.50	36.33	36.77	261392	2799464
260	264	I	7.1	34.22	38.16	38.50	255472					3055000
261	265	P0	7.0	32.92	37.14	37.39	140792	33.52	37.62	37.91	396264	3195792
262	260	B	9.0	32.49	36.51	36.81	127912					3323704
263	261	B	10.0	32.19	36.25	36.49	136344	32.34	36.38	36.65	264256	3460048
264	262	B	10.5	32.23	36.05	36.53	132464					132464
265	263	B	7.7	33.39	36.96	37.53	141392	32.77	36.48	37.00	273856	273856
266	270	P1	6.9	33.03	37.17	37.27	189528					463384
267	271	P2	8.2	32.27	36.64	36.88	133648	32.63	36.89	37.07	323176	597032
268	266	B	9.3	32.32	36.21	36.57	122216					719248
269	267	B	11.0	31.75	35.74	35.99	129248	32.03	35.97	36.27	251464	848496
270	268	B	11.0	31.68	35.61	35.93	132568					981064
271	269	B	8.7	32.74	36.51	36.93	128864	32.18	36.03	36.40	261432	1109928
272	276	P1	7.9	32.45	36.56	36.76	181528					1291456
273	277	P2	7.9	32.48	36.78	36.96	146608	32.47	36.67	36.86	328136	1438064
274	272	B	10.3	31.85	35.81	36.11	122400					1560464
275	273	B	11.5	31.40	35.45	35.66	127368	31.62	35.63	35.88	249768	1687832
276	274	B	11.8	31.47	35.25	35.63	123344					1811176
277	275	B	9.7	32.25	35.91	36.40	121720	31.84	35.57	36.00	245064	1932896
278	282	P1	7.3	33.03	36.90	37.22	186712					2119608
279	283	P2	8.6	32.32	36.35	36.69	130224	32.66	36.62	36.95	316936	2249832
280	278	B	10.3	31.92	35.78	36.28	117288					2367120
281	279	B	11.5	31.64	35.44	35.83	129000	31.78	35.61	36.05	246288	2496120
282	280	B	11.0	31.97	35.50	35.95	131736					2627856
283	281	B	9.7	32.53	36.05	36.48	119520	32.24	35.76	36.20	251256	2747376
284	288	I	9.6	33.32	37.22	37.65	233736					2981176
285	289	P0	10.0	31.79	35.94	36.38	115944	32.49	36.54	36.97	349680	3097120
286	284	B	10.3	31.91	35.83	36.28	122536					3219656
287	285	B	11.0	31.68	35.50	35.98	133952	31.79	35.66	36.13	256488	3353608
288	286	B	10.3	32.18	35.83	36.34	136200					136200
289	287	B	9.7	32.45	36.11	36.67	119656	32.31	35.97	36.50	255856	255856
290	294	P1	6.9	33.18	37.03	37.45	191560					447416
291	295	P2	7.7	32.64	36.69	37.12	141672	32.90	36.85	37.28	333232	589088
292	290	B	9.3	32.18	36.08	36.55	133920					723008
293	291	B	11.0	31.66	35.61	35.97	130752	31.92	35.84	36.25	264672	853760
294	292	B	10.5	32.01	35.69	36.23	132848					986608
295	293	B	8.7	32.80	36.34	36.96	124600	32.39	36.00	36.58	257448	1111208
296	298	P1	6.7	33.18	36.99	37.37	209752					1320960
297	299	P2	7.4	32.89	36.70	37.24	141144	33.03	36.84	37.30	350896	1462104
298	296	B	8.5	32.45	36.47	36.87	138048					1600152
299	297	B	8.5	32.45	36.37	36.86	129728	32.45	36.42	36.87	267776	1729880

7. Variable length code tables

This section contains the variable length code tables for macroblock addressing, macroblock type, macroblock pattern, motion vectors, and DCT coefficients.

7.1 Macroblock addressing

Table 7-1. Variable length codes for macroblock_address_increment.

macroblock_address_ increment VLC code	increment value	macroblock_address_ increment VLC code	increment value
1	1	0000 0101 10	17
011	2	0000 0101 01	18
010	3	0000 0101 00	19
0011	4	0000 0100 11	20
0010	5	0000 0100 10	21
0001 1	6	0000 0100 011	22
0001 0	7	0000 0100 010	23
0000 111	8	0000 0100 001	24
0000 110	9	0000 0100 000	25
0000 1011	10	0000 0011 111	26
0000 1010	11	0000 0011 110	27
0000 1001	12	0000 0011 101	28
0000 1000	13	0000 0011 100	29
0000 0111	14	0000 0011 011	30
0000 0110	15	0000 0011 010	31
0000 0101 11	16	0000 0011 001	32
		0000 0011 000	33
		0000 0001 111	macroblock_stuffing
		0000 0001 000	macroblock_escape

7.2 Macroblock type

Table 7-2a. Variable length codes for macroblock_type in intra-coded pictures (I-pictures).

VLC code	macroblock_quant
1	0
01	1

NOTE - macroblock_intra = 1, macroblock_pattern = 0, macroblock_motion_forward = 0, macroblock_motion_backward = 0

Table 7-2b. Variable length codes for macroblock_type in predictive-coded pictures (P0- and P1-pictures).

VLC code	macroblock_ quant	macroblock_ motion_forward	macroblock_ pattern	macroblock_ intra
1	0	1	1	0
01	0	1	0	0
001	0	0	1	0
00011	0	0	0	1
00010	1	1	1	0
00001	1	0	1	0
000001	1	0	0	1

NOTE - macroblock_motion_backward = 0

Table 7-2c. Variable length codes for macroblock_type in bi-directionally predictive-coded pictures (P2- and B-pictures).

VLC code	macroblock_ quant	macroblock_ motion_ forward	macroblock_ motion_ backward	macroblock_ pattern	macroblock_ intra
10	0	1	1	0	0
11	0	1	1	1	0
010	0	0	1	0	0
011	0	0	1	1	0
0010	0	1	0	0	0
0011	0	1	0	1	0
00011	0	0	0	0	1
00010	1	1	1	1	0
000011	1	1	0	1	0
000010	1	0	1	1	0
000001	1	0	0	0	1

Table 7-2d. Variable length codes for macroblock_type in dc intra-coded pictures (D-pictures).

VLC code	macroblock_quant
1	0

NOTE - macroblock_intra = 1, macroblock_pattern = 0, macroblock_motion_forward = 0, macroblock_motion_backward = 0

7.3 Macroblock pattern

Table 7-3. Variable length codes for coded_block_pattern.

coded_block_pattern VLC code	cbp	coded_block_pattern VLC code	cbp
11	8	000100	6
10	12	000011	9
011	4	000010	10
010	14	0000011	3
0011	13	0000010	5
0010	15	0000001	7
00011	2	00000001	11
000101	1		

7.4 Motion vectors

Table 7-4a. Variable length codes for motion_horizontal_forward, motion_vertical_forward, motion_horizontal_backward, and motion_vertical_backward when forward_f or backward_f is 1.

motion VLC code	little	big
0000 0011 001	-16	16
0000 0011 011	-15	17
0000 0011 101	-14	18
0000 0011 111	-13	19
0000 0100 001	-12	20
0000 0100 011	-11	21
0000 0100 11	-10	22
0000 0101 01	-9	23
0000 0101 11	-8	24
0000 0111	-7	25
0000 1001	-6	26
0000 1011	-5	27
0000 111	-4	28
0001 1	-3	29
0011	-2	30
011	-1	31
1	0	
010	1	-31
0010	2	-30
0001 0	3	-29
0000 110	4	-28
0000 1010	5	-27
0000 1000	6	-26
0000 0110	7	-25
0000 0101 10	8	-24
0000 0101 00	9	-23
0000 0100 10	10	-22
0000 0100 010	11	-21
0000 0100 000	12	-20
0000 0011 110	13	-19
0000 0011 100	14	-18
0000 0011 010	15	-17
0000 0011 000	N/A	N/A

N/A - These table entries are not used and should not be generated by an encoder.

Table 7-4b. Variable length codes for motion_horizontal_forward, motion_vertical_forward, motion_horizontal_backward, and motion_vertical_backward when forward_f or backward_f is 2.

motion VLC code	little		big	
(NOTE)	b = 0	b = 1	b = 1	b = 0
0000 0011 001 b	-31	-32	32	33
0000 0011 011 b	-29	-30	34	35
0000 0011 101 b	-27	-28	36	37
0000 0011 111 b	-25	-26	38	39
0000 0100 001 b	-23	-24	40	41
0000 0100 011 b	-21	-22	42	43
0000 0100 11 b	-19	-20	44	45
0000 0101 01 b	-17	-18	46	47
0000 0101 11 b	-15	-16	48	49
0000 0111 b	-13	-14	50	51
0000 1001 b	-11	-12	52	53
0000 1011 b	-9	-10	54	55
0000 111 b	-7	-8	56	57
0001 1 b	-5	-6	58	59
0011 b	-3	-4	60	61
011 b	-1	-2	62	63
1	0			
010 b	1	2	-62	-63
0010 b	3	4	-60	-61
0001 0 b	5	6	-58	-59
0000 110 b	7	8	-56	-57
0000 1010 b	9	10	-54	-55
0000 1000 b	11	12	-52	-53
0000 0110 b	13	14	-50	-51
0000 0101 10 b	15	16	-48	-49
0000 0101 00 b	17	18	-46	-47
0000 0100 10 b	19	20	-44	-45
0000 0100 010 b	21	22	-42	-43
0000 0100 000 b	23	24	-40	-41
0000 0011 110 b	25	26	-38	-39
0000 0011 100 b	27	28	-36	-37
0000 0011 010 b	29	30	-34	-35
0000 0011 000 b	31	N/A	N/A	-33

N/A - These table entries are not used and should not be generated by an encoder.
NOTE- For VLC code 1, no b extension bit follows.

Table 7-4c. Variable length codes for motion_horizontal_forward, motion_vertical_forward, motion_horizontal_backward, and motion_vertical_backward when forward_f or backward_f is 3.

motion VLC code	little			big		
(NOTE)	bb = 0	bb = 10	bb = 11	bb = 11	bb = 10	bb = 0
0000 0011 001 bb	-46	-47	-48	48	49	50
0000 0011 011 bb	-43	-44	-45	51	52	53
0000 0011 101 bb	-40	-41	-42	54	55	56
0000 0011 111 bb	-37	-38	-39	57	58	59
0000 0100 001 bb	-34	-35	-36	60	61	62
0000 0100 011 bb	-31	-32	-33	63	64	65
0000 0100 11 bb	-28	-29	-30	66	67	68
0000 0101 01 bb	-25	-26	-27	69	70	71
0000 0101 11 bb	-22	-23	-24	72	73	74
0000 0111 bb	-19	-20	-21	75	76	77
0000 1001 bb	-16	-17	-18	78	79	80
0000 1011 bb	-13	-14	-15	81	82	83
0000 111 bb	-10	-11	-12	84	85	86
0001 1 bb	-7	-8	-9	87	88	89
0011 bb	-4	-5	-6	90	91	92
011 bb	-1	-2	-3	93	94	95
1	0					
010 bb	1	2	3	-93	-94	-95
0010 bb	4	5	6	-90	-91	-92
0001 0 bb	7	8	9	-87	-88	-89
0000 110 bb	10	11	12	-84	-85	-86
0000 1010 bb	13	14	15	-81	-82	-83
0000 1000 bb	16	17	18	-78	-79	-80
0000 0110 bb	19	20	21	-75	-76	-77
0000 0101 10 bb	22	23	24	-72	-73	-74
0000 0101 00 bb	25	26	27	-69	-70	-71
0000 0100 10 bb	28	29	30	-66	-67	-68
0000 0100 010 bb	31	32	33	-63	-64	-65
0000 0100 000 bb	34	35	36	-60	-61	-62
0000 0011 110 bb	37	38	39	-57	-58	-59
0000 0011 100 bb	40	41	42	-54	-55	-56
0000 0011 010 bb	43	44	45	-51	-52	-53
0000 0011 000 bb	46	47	N/A	N/A	-49	-50

N/A - These table entries are not used and should not be generated by an encoder.
NOTE- For VLC code 1, no bb extension bit follows. One or two extension bits follows the VLC as indicated in the heading.

Table 7-4d. Variable length codes for motion_horizontal_forward, motion_vertical_forward, motion_horizontal_backward, and motion_vertical_backward when forward_f or backward_f is 4.

motion VLC code (NOTE)	little bb = 00	bb = 01	bb = 10	bb = 11	big bb = 11	bb = 10	bb = 01	bb = 00
0000 0011 001 bb	-61	-62	-63	-64	64	65	66	67
0000 0011 011 bb	-57	-58	-59	-60	68	69	70	71
0000 0011 101 bb	-53	-54	-55	-56	72	73	74	75
0000 0011 111 bb	-49	-50	-51	-52	76	77	78	79
0000 0100 001 bb	-45	-46	-47	-48	80	81	82	83
0000 0100 011 bb	-41	-42	-43	-44	84	85	86	87
0000 0100 11 bb	-37	-38	-39	-40	88	89	90	91
0000 0101 01 bb	-33	-34	-35	-36	92	93	94	95
0000 0101 11 bb	-29	-30	-31	-32	96	97	98	99
0000 0111 bb	-25	-26	-27	-28	100	101	102	103
0000 1001 bb	-21	-22	-23	-24	104	105	106	107
0000 1011 bb	-17	-18	-19	-20	108	109	110	111
0000 111 bb	-13	-14	-15	-16	112	113	114	115
0001 1 bb	-9	-10	-11	-12	116	117	118	119
0011 bb	-5	-6	-7	-8	120	121	122	123
011 bb	-1	-2	-3	-4	124	125	126	127
1	0							
010 bb	1	2	3	4	-124	-125	-126	-127
0010 bb	5	6	7	8	-120	-121	-122	-123
0001 0 bb	9	10	11	12	-116	-117	-118	-119
0000 110 bb	13	14	15	16	-112	-113	-114	-115
0000 1010 bb	17	18	19	20	-108	-109	-110	-111
0000 1000 bb	21	22	23	24	-104	-105	-106	-107
0000 0110 bb	25	26	27	28	-100	-101	-102	-103
0000 0101 10 bb	29	30	31	32	-96	-97	-98	-99
0000 0101 00 bb	33	34	35	36	-92	-93	-94	-95
0000 0100 10 bb	37	38	39	40	-88	-89	-90	-91
0000 0100 010 bb	41	42	43	44	-84	-85	-86	-87
0000 0100 000 bb	45	46	47	48	-80	-81	-82	-83
0000 0011 110 bb	49	50	51	52	-76	-77	-78	-79
0000 0011 100 bb	53	54	55	56	-72	-73	-74	-75
0000 0011 010 bb	57	58	59	60	-68	-69	-70	-71
0000 0011 000 bb	61	62	63	N/A	N/A	-65	-66	-67

N/A - These table entries are not used and should not be generated by an encoder.
NOTE- For VLC code 1, no bb extension bit follows.

Table 7-4e. Variable length codes for motion_horizontal_forward, motion_vertical_forward, motion_horizontal_backward, and motion_vertical_backward when forward_f or backward_f is 5.

motion VLC code (NOTE)	little bbb = 00	bbb = 01	bbb = 10	bbb = 110	bbb = 111	big bbb = 111	bbb = 110	bbb = 10	bbb = 01	bbb = 00
0000 0011 001 bbb	-76	-77	-78	-79	-80	80	81	82	83	84
0000 0011 011 bbb	-71	-72	-73	-74	-75	85	86	87	88	89
0000 0011 101 bbb	-66	-67	-68	-69	-70	90	91	92	93	94
0000 0011 111 bbb	-61	-62	-63	-64	-65	95	96	97	98	99
0000 0100 001 bbb	-56	-57	-58	-59	-60	100	101	102	103	104
0000 0100 011 bbb	-51	-52	-53	-54	-55	105	106	107	108	109
0000 0100 11 bbb	-46	-47	-48	-49	-50	110	111	112	113	114
0000 0101 01 bbb	-41	-42	-43	-44	-45	115	116	117	118	119
0000 0101 11 bbb	-36	-37	-38	-39	-40	120	121	122	123	124
0000 0111 bbb	-31	-32	-33	-34	-35	125	126	127	128	129
0000 1001 bbb	-26	-27	-28	-29	-30	130	131	132	133	134
0000 1011 bbb	-21	-22	-23	-24	-25	135	136	137	138	139
0000 111 bbb	-16	-17	-18	-19	-20	140	141	142	143	144
0001 1 bbb	-11	-12	-13	-14	-15	145	146	147	148	149
0011 bbb	-6	-7	-8	-9	-10	150	151	152	153	154
011 bbb	-1	-2	-3	-4	-5	155	156	157	158	159
1	0									
010 bbb	1	2	3	4	5	-155	-156	-157	-158	-159
0010 bbb	6	7	8	9	10	-150	-151	-152	-153	-154
0001 0 bbb	11	12	13	14	15	-145	-146	-147	-148	-149
0000 110 bbb	16	17	18	19	20	-140	-141	-142	-143	-144
0000 1010 bbb	21	22	23	24	25	-135	-136	-137	-138	-139
0000 1000 bbb	26	27	28	29	30	-130	-131	-132	-133	-134
0000 0110 bbb	31	32	33	34	35	-125	-126	-127	-128	-129
0000 0101 10 bbb	36	37	38	39	40	-120	-121	-122	-123	-124
0000 0101 00 bbb	41	42	43	44	45	-115	-116	-117	-118	-119
0000 0100 10 bbb	46	47	48	49	50	-110	-111	-112	-113	-114
0000 0100 010 bbb	51	52	53	54	55	-105	-106	-107	-108	-109
0000 0100 000 bbb	56	57	58	59	60	-100	-101	-102	-103	-104
0000 0011 110 bbb	61	62	63	64	65	-95	-96	-97	-98	-99
0000 0011 100 bbb	66	67	68	69	70	-90	-91	-92	-93	-94
0000 0011 010 bbb	71	72	73	74	75	-85	-86	-87	-88	-89
0000 0011 000 bbb	76	77	78	79	N/A	N/A	-81	-82	-83	-84

N/A - These table entries are not used and should not be generated by an encoder.
NOTE- For VLC code 1, no bbb extension bit follows. Two or three extension bits follows the VLC as indicated in the heading.

Table 7-4f. Variable length codes for motion_horizontal_forward, motion_vertical_forward, motion_horizontal_backward, and motion_vertical_backward when forward_f or backward_f is 6.

motion VLC code (NOTE)	little bbb = 00	bbb = 01	bbb = 100	bbb = 101	bbb = 110	bbb = 111	big bbb = 111	bbb = 110	bbb = 101	bbb = 100	bbb = 01	bbb = 00
0000 0011 001 bbb	-91	-92	-93	-94	-95	-96	96	97	98	99	100	101
0000 0011 011 bbb	-85	-86	-87	-88	-89	-90	102	103	104	105	106	107
0000 0011 101 bbb	-79	-80	-81	-82	-83	-84	108	109	110	111	112	113
0000 0011 111 bbb	-73	-74	-75	-76	-77	-78	114	115	116	117	118	119
0000 0100 001 bbb	-67	-68	-69	-70	-71	-72	120	121	122	123	124	125
0000 0100 011 bbb	-61	-62	-63	-64	-65	-66	126	127	128	129	130	131
0000 0100 11 bbb	-55	-56	-57	-58	-59	-60	132	133	134	135	136	137
0000 0101 01 bbb	-49	-50	-51	-52	-53	-54	138	139	140	141	142	143
0000 0101 11 bbb	-43	-44	-45	-46	-47	-48	144	145	146	147	148	149
0000 0111 bbb	-37	-38	-39	-40	-41	-42	150	151	152	153	154	155
0000 1001 bbb	-31	-32	-33	-34	-35	-36	156	157	158	159	160	161
0000 1011 bbb	-25	-26	-27	-28	-29	-30	162	163	164	165	166	167
0000 111 bbb	-19	-20	-21	-22	-23	-24	168	169	170	171	172	173
0001 1 bbb	-13	-14	-15	-16	-17	-18	174	175	176	177	178	179
0011 bbb	-7	-8	-9	-10	-11	-12	180	181	182	183	184	185
011 bbb	-1	-2	-3	-4	-5	-6	186	187	188	189	190	191
1	0											
010 bbb	1	2	3	4	5	6	-186	-187	-188	-189	-190	-191
0010 bbb	7	8	9	10	11	12	-180	-181	-182	-183	-184	-185
0001 0 bbb	13	14	15	16	17	18	-174	-175	-176	-177	-178	-179
0000 110 bbb	19	20	21	22	23	24	-168	-169	-170	-171	-172	-173
0000 1010 bbb	25	26	27	28	29	30	-162	-163	-164	-165	-166	-167
0000 1000 bbb	31	32	33	34	35	36	-156	-157	-158	-159	-160	-161
0000 0110 bbb	37	38	39	40	41	42	-150	-151	-152	-153	-154	-155
0000 0101 10 bbb	43	44	45	46	47	48	-144	-145	-146	-147	-148	-149
0000 0101 00 bbb	49	50	51	52	53	54	-138	-139	-140	-141	-142	-143
0000 0100 10 bbb	55	56	57	58	59	60	-132	-133	-134	-135	-136	-137
0000 0100 010 bbb	61	62	63	64	65	66	-126	-127	-128	-129	-130	-131
0000 0100 000 bbb	67	68	69	70	71	72	-120	-121	-122	-123	-124	-125
0000 0011 110 bbb	73	74	75	76	77	78	-114	-115	-116	-117	-118	-119
0000 0011 100 bbb	79	80	81	82	83	84	-108	-109	-110	-111	-112	-113
0000 0011 010 bbb	85	86	87	88	89	90	-102	-103	-104	-105	-106	-107
0000 0011 000 bbb	91	92	93	94	95	N/A	N/A	-97	-98	-99	-100	-101

N/A - These table entries are not used and should not be generated by an encoder.
NOTE- For VLC code 1, no bbb extension bit follows. Two or three extension bits follows the VLC as indicated in the heading.

Table 7-4g. Variable length codes for dmv_horizontal_forward, dmv_vertical_forward, dmv_horizontal_backward and dmv_vertical_backward.

dmv_horizontal/vertical_forward/backward VLC code	dmv value
0	0
10	1
11	-1

7.5 DCT coefficients

Table 7-5a. Variable length codes for dct_dc_size_luminance.

VLC code	dct_dc_size_luminance
100	0
00	1
01	2
101	3
110	4
1110	5
11110	6
111110	7
1111110	8

Table 7-5b. Variable length codes for dct_dc_size_chrominance.

VLC code	dct_dc_size_chrominance
00	0
01	1
10	2
110	3
1110	4
11110	5
111110	6
1111110	7
11111110	8

Table 7-5c. Variable length codes for dct_coeff_first.

dct_coeff_first variable length code (NOTE)	run	level
1s	0	1
011s	1	1
0101s	0	2
01001s	0	3
01000s	2	1
00111s	3	1
001101s	0	4
001100s	1	2
001011s	4	1
001010s	5	1
001001s	6	1
0010001s	0	5
0010000s	2	2
0001111s	7	1
0001110s	8	1
0001101s	9	1
00011001s	0	6
00011000s	0	7
00010111s	1	3
00010110s	3	2
00010101s	4	2
00010100s	5	2
00010011s	12	1
00010010s	16	1
000100011s	0	8
000100010s	0	9
000100001s	1	4
000100000s	6	2
000011111s	7	2
000011110s	8	2
000011101s	9	2
000011100s	10	1
000011011s	11	1
000011010s	13	1
000011001s	14	1
000011000s	17	1

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5d. Variable length codes for dct_coeff_first.

dct_coeff_first variable length code (NOTE)	run	level
000010111s	18	1
000010110s	19	1
000010101s	24	1
000010100s	32	1
0000100111s	0	10
0000100110s	0	11
0000100101s	0	12
0000100100s	1	5
0000100011s	2	3
0000100010s	15	1
0000100001s	16	2
0000100000s	20	1
0000011111s	21	1
0000011110s	22	1
0000011101s	25	1
0000011100s	33	1
0000011011s	35	1
0000011010s	40	1
0000011001s	41	1
0000011000s	43	1
0000010111s	44	1
0000010110	escape	
00000101011s	0	13
00000101010s	0	14
00000101001s	0	15
00000101000s	1	6
00000100111s	2	4
00000100110s	3	3
00000100101s	4	3
00000100100s	5	3
00000100011s	10	2
00000100010s	11	2
00000100001s	12	2
00000100000s	23	1
00000011111s	24	2
00000011110s	26	1
00000011101s	27	1
00000011100s	28	1

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5e. Variable length codes for dct_coeff_first.

dct_coeff_first variable length code (NOTE)	run	level
00000011011s	32	2
00000011010s	34	1
00000011001s	36	1
00000011000s	40	2
00000010111s	42	1
00000010110s	48	1
000000101011s	0	16
000000101010s	0	17
000000101001s	0	18
000000101000s	1	7
000000100111s	6	3
000000100110s	8	3
000000100101s	13	2
000000100100s	14	2
000000100011s	15	2
000000100010s	17	2
000000100001s	18	2
000000100000s	19	2
000000011111s	20	2
000000011110s	29	1
000000011101s	30	1
000000011100s	31	1
000000011011s	37	1
000000011010s	39	1
000000011001s	43	2
000000011000s	44	2
000000010111s	49	1
000000010110s	50	1
000000010101s	51	1
0000000101001s	0	19
0000000101000s	0	20
0000000100111s	0	21
0000000100110s	0	22
0000000100101s	0	25
0000000100100s	1	8
0000000100011s	2	5
0000000100010s	3	4
0000000100001s	4	4

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5f. Variable length codes for dct_coeff_first.

dct_coeff_first variable length code (NOTE)	run	level
0000000100000s	5	4
0000000011111s	7	3
0000000011110s	21	2
0000000011101s	22	2
0000000011100s	25	2
0000000011011s	26	2
0000000011010s	33	2
0000000011001s	35	2
0000000011000s	36	2
0000000010111s	38	1
0000000010110s	41	2
0000000010101s	42	2
0000000010100s	45	1
0000000010011s	48	2
0000000010010s	52	1
00000000100011s	0	23
00000000100010s	0	24
00000000100001s	0	26
00000000100000s	0	27
00000000011111s	0	28
00000000011110s	1	9
00000000011101s	1	10
00000000011100s	2	6
00000000011011s	3	5
00000000011010s	6	4
00000000011001s	8	4
00000000011000s	9	3
00000000010111s	16	3
00000000010110s	23	2
00000000010101s	24	3
00000000010100s	27	2
00000000010011s	28	2
00000000010010s	34	2
00000000010001s	46	1
00000000010000s	47	1
00000000001111s	49	2
000000000011101s	0	29
000000000011100s	0	30
000000000011011s	0	31

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5g. Variable length codes for dct_coeff_first.

dct_coeff_first variable length code (NOTE)	run	level
000000000011010s	0	32
000000000011001s	0	33
000000000011000s	1	11
000000000010111s	2	7
000000000010110s	4	5
000000000010101s	10	3
000000000010100s	29	2
000000000010011s	30	2
000000000010010s	32	3
000000000010001s	53	1
000000000010000s	54	1
000000000001111s	56	1
0000000000011101s	0	34
0000000000011100s	0	35
0000000000011011s	0	36
0000000000011010s	0	37
0000000000011001s	0	38
0000000000011000s	0	39
0000000000010111s	0	42
0000000000010110s	1	12
0000000000010101s	1	13
0000000000010100s	1	14
0000000000010011s	3	6
0000000000010010s	5	5
0000000000010001s	7	4
0000000000010000s	8	5
0000000000001111s	9	4
0000000000001110s	11	3
0000000000001101s	12	3
0000000000001100s	15	3
0000000000001011s	31	2
0000000000001010s	37	2
0000000000001001s	38	2
0000000000001000s	39	2
0000000000000111s	40	3
0000000000000110s	43	3
0000000000000101s	45	2
0000000000000100s	50	2
0000000000000011s	55	1
0000000000000010s	57	1

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5h. Variable length codes for dct_coeff_next.

dct_coeff_next variable length code (NOTE)	run	level
01s	0	1
001s	0	2
100s	1	1
1010s	2	1
10110s	0	3
10111s	0	4
11000s	1	2
11001s	3	1
110100s	0	5
110101s	4	1
110110s	5	1
110111s	6	1
1110000s	0	6
1110001s	1	3
1110010s	2	2
1110011s	3	2
1110100s	7	1
11101010s	0	7
11101011s	0	8
11101100s	1	4
11101101s	4	2
11101110s	5	2
11101111s	6	2
11110000s	8	1
11110001s	9	1
11110010s	10	1
111100110s	0	9
111100111s	0	10
111101000s	0	11
111101001s	1	5
111101010s	2	3
111101011s	3	3
111101100s	7	2
111101101s	11	1
111101110s	12	1
111101111s	13	1

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5i. Variable length codes for dct_coeff_next.

dct_coeff_next variable length code (NOTE)	run	level
111110000s	15	1
1111100010s	0	12
1111100011s	0	13
1111100100s	0	14
1111100101s	1	6
1111100110s	2	4
1111100111s	4	3
1111101000s	8	2
1111101001s	14	1
1111101010s	16	1
1111101011	escape	
11111011000s	0	15
11111011001s	0	16
11111011010s	0	17
11111011011s	1	7
11111011100s	1	8
11111011101s	2	5
11111011110s	3	4
11111011111s	5	3
11111100000s	6	3
11111100001s	7	3
11111100010s	9	2
11111100011s	10	2
11111100100s	15	2
11111100101s	17	1
11111100110s	18	1
11111100111s	19	1
11111101000s	20	1
11111101001s	23	1
111111010100s	0	18
111111010101s	0	19
111111010110s	0	20
111111010111s	1	9
111111011000s	1	10
111111011001s	2	6
111111011010s	3	5
111111011011s	4	4
111111011100s	5	4
111111011101s	11	2

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5j. Variable length codes for dct_coeff_next.

dct_coeff_next variable length code (NOTE)	run	level
111111011110s	12	2
111111011111s	13	2
111111100000s	14	2
111111100001s	21	1
111111100010s	22	1
111111100011s	24	1
111111100100s	25	1
111111100101s	26	1
111111100110s	31	1
1111111001110s	0	21
1111111001111s	0	22
1111111010000s	0	23
1111111010001s	0	24
1111111010010s	0	25
1111111010011s	1	11
1111111010100s	1	12
1111111010101s	2	7
1111111010110s	3	6
1111111010111s	4	5
1111111011000s	5	5
1111111011001s	6	4
1111111011010s	7	4
1111111011011s	8	3
1111111011100s	16	2
1111111011101s	17	2
1111111011110s	18	2
1111111011111s	23	2
1111111100000s	27	1
1111111100001s	28	1
1111111100010s	29	1
1111111100011s	30	1
1111111100100s	32	1
1111111100101s	33	1
1111111100110s	34	1
1111111100111s	39	1
11111111010000s	0	26
11111111010001s	0	27
11111111010010s	0	28
11111111010011s	0	29
11111111010100s	1	13

NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.

Table 7-5k. Variable length codes for dct_coeff_next.

dct_coeff_next variable length code (NOTE)	run	level
11111111010101s	1	14
11111111010110s	2	8
11111111010111s	2	9
11111111011000s	3	7
11111111011001s	3	8
11111111011010s	4	6
11111111011011s	5	6
11111111011100s	6	5
11111111011101s	15	3
11111111011110s	19	2
11111111011111s	20	2
11111111100000s	21	2
11111111100001s	22	2
11111111100010s	24	2
11111111100011s	31	2
11111111100100s	35	1
11111111100101s	36	1
11111111100110s	37	1
11111111100111s	38	1
11111111101000s	40	1
11111111101001s	41	1
111111111010100s	0	30
111111111010101s	0	31
111111111010110s	0	32
111111111010111s	0	33
111111111011000s	1	15
111111111011001s	1	16
111111111011010s	1	17
111111111011011s	2	10
111111111011100s	3	9
111111111011101s	4	7
111111111011110s	5	7
111111111011111s	6	6
111111111100000s	7	5
111111111100001s	9	3
111111111100010s	10	3
111111111100011s	11	3
111111111100100s	12	3
111111111100101s	13	3
111111111100110s	14	3
NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.		

Table 7-5l. Variable length codes for dct_coeff_next.

dct_coeff_next variable length code (NOTE)	run	level
111111111100111s	25	2
111111111101000s	26	2
111111111101001s	27	2
111111111101010s	28	2
111111111101011s	29	2
111111111101100s	30	2
111111111101101s	32	2
111111111101110s	39	2
111111111101111s	42	1
111111111110000s	43	1
111111111110001s	47	1
1111111111100100s	0	34
1111111111100101s	0	35
1111111111100110s	0	36
1111111111100111s	1	18
1111111111101000s	1	19
1111111111101001s	1	20
1111111111101010s	1	21
1111111111101011s	2	11
1111111111101100s	2	12
1111111111101101s	3	10
1111111111101110s	3	11
1111111111101111s	4	8
1111111111110000s	4	9
1111111111110001s	5	8
1111111111110010s	6	7
1111111111110011s	7	6
1111111111110100s	8	4
1111111111110101s	33	2
1111111111110110s	34	2
1111111111110111s	35	2
1111111111111000s	36	2
1111111111111001s	37	2
1111111111111010s	38	2
1111111111111011s	40	2
1111111111111100s	44	1
1111111111111101s	45	1
1111111111111110s	46	1
1111111111111111s	48	1
NOTE - The last bit 's' denotes the sign of the level, '0' for positive, '1' for negative.		

Table 7-5m. Encoding of run and level following escape code as a 20-bit fixed length code (-127 <= level <= 127) or as a 28-bit fixed length code (-255 <= level <= -128, 128 <= level <= 255).

fixed length code	run
0000 00	0
0000 01	1
0000 10	2
...	...
...	...
...	...
...	...
...	...
...	...
1111 11	63

fixed length code	level
forbidden	-256
1000 0000 0000 0001	-255
1000 0000 0000 0010	-254
...	
1000 0000 0111 1111	-129
1000 0000 1000 0000	-128
1000 0001	-127
1000 0010	-126
...	...
1111 1110	-2
1111 1111	-1
forbidden	0
0000 0001	1
...	...
0111 1111	127
0000 0000 1000 0000	128
0000 0000 1000 0001	129
...	
0000 0000 1111 1111	255