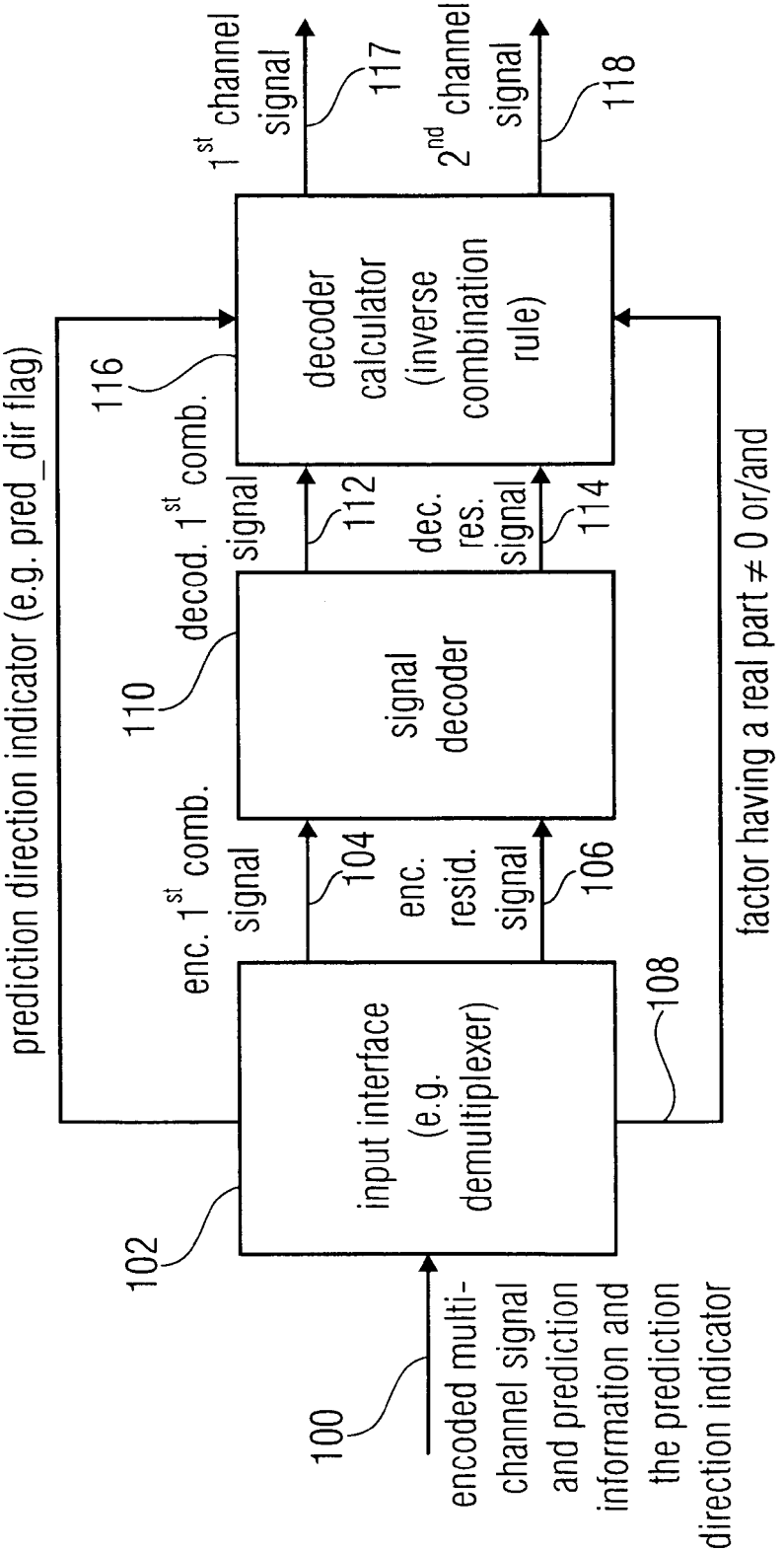


FIG 1
(AUDIO DECODER)

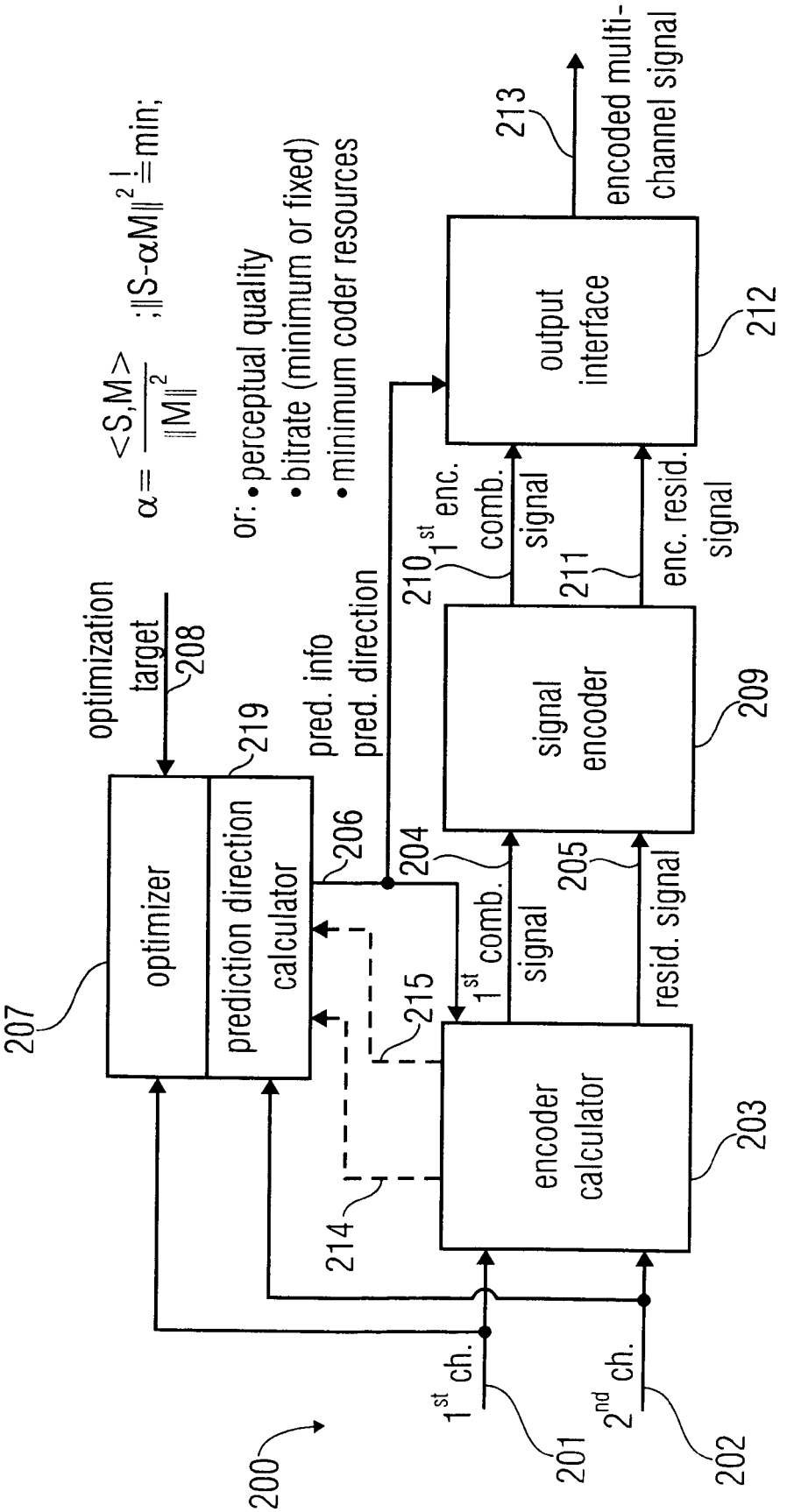


FIG 2
(AUDIO ENCODER)

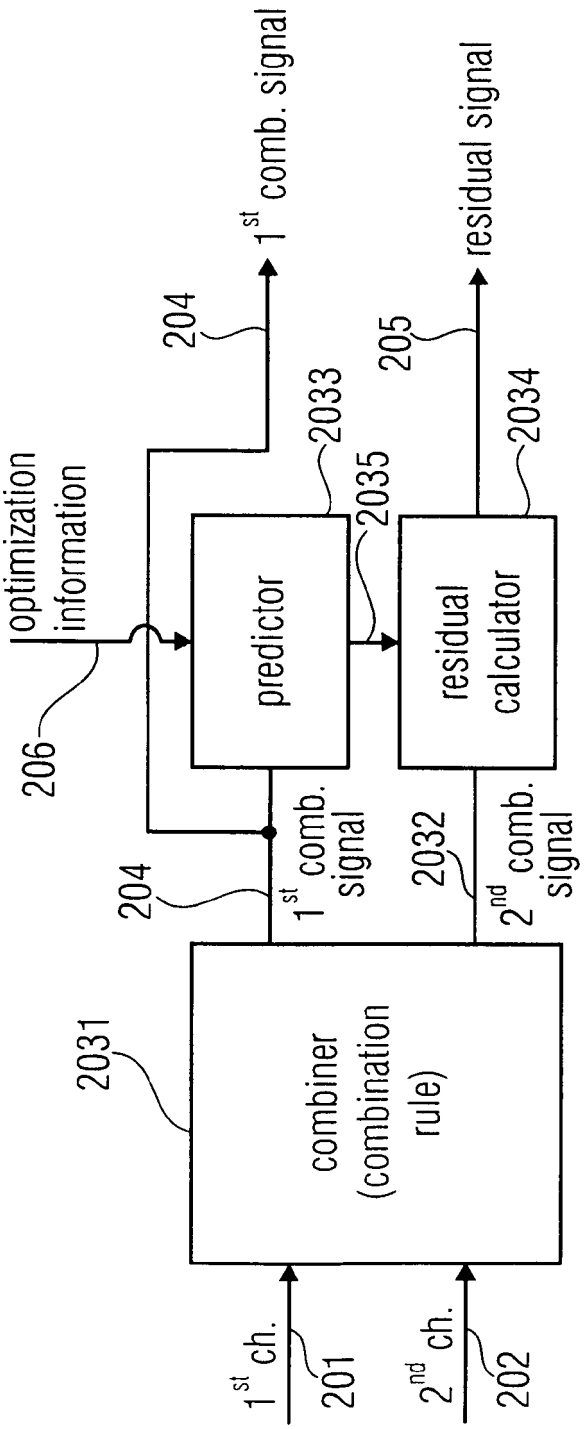
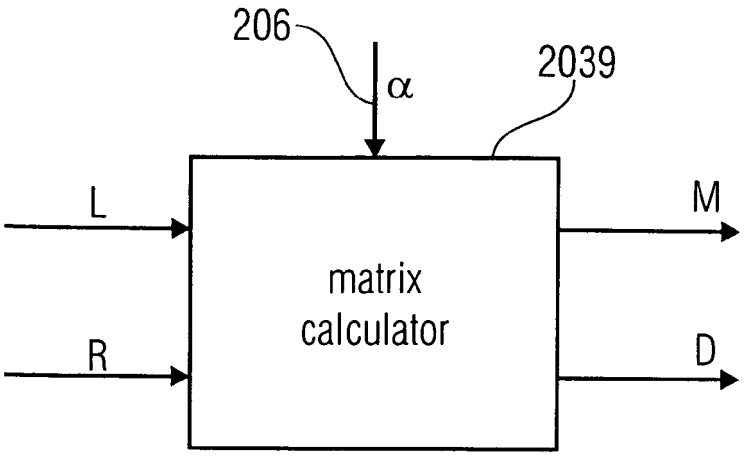


FIG 3A
(AUDIO ENCODER SIDE)



$$\alpha = RE_\alpha + jIm_\alpha$$

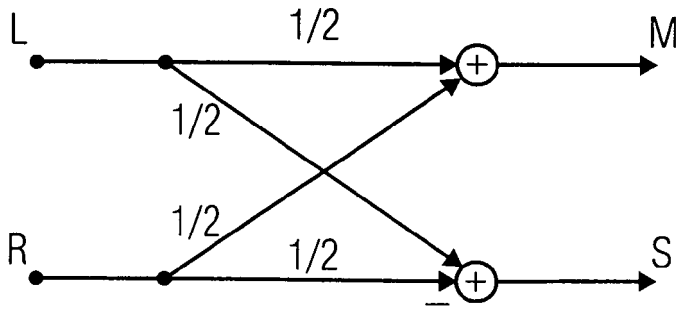
$$\alpha = |\alpha| \cdot e^{j\varphi\alpha} \quad \alpha$$

1st part: RE_α or | |

2nd part: Im_α or φ_α

$$\begin{bmatrix} M \\ D \end{bmatrix} = \frac{1}{2} \begin{bmatrix} 1 & 1 \\ 1-\alpha & -1-\alpha \end{bmatrix} \begin{bmatrix} L \\ R \end{bmatrix}$$

FIG 3B
(AUDIO ENCODER SIDE)



$$M = \frac{1}{2}(L+R)$$

$$S = \frac{1}{2}(L-R)$$

FIG 3C
(COMBINATION RULE)

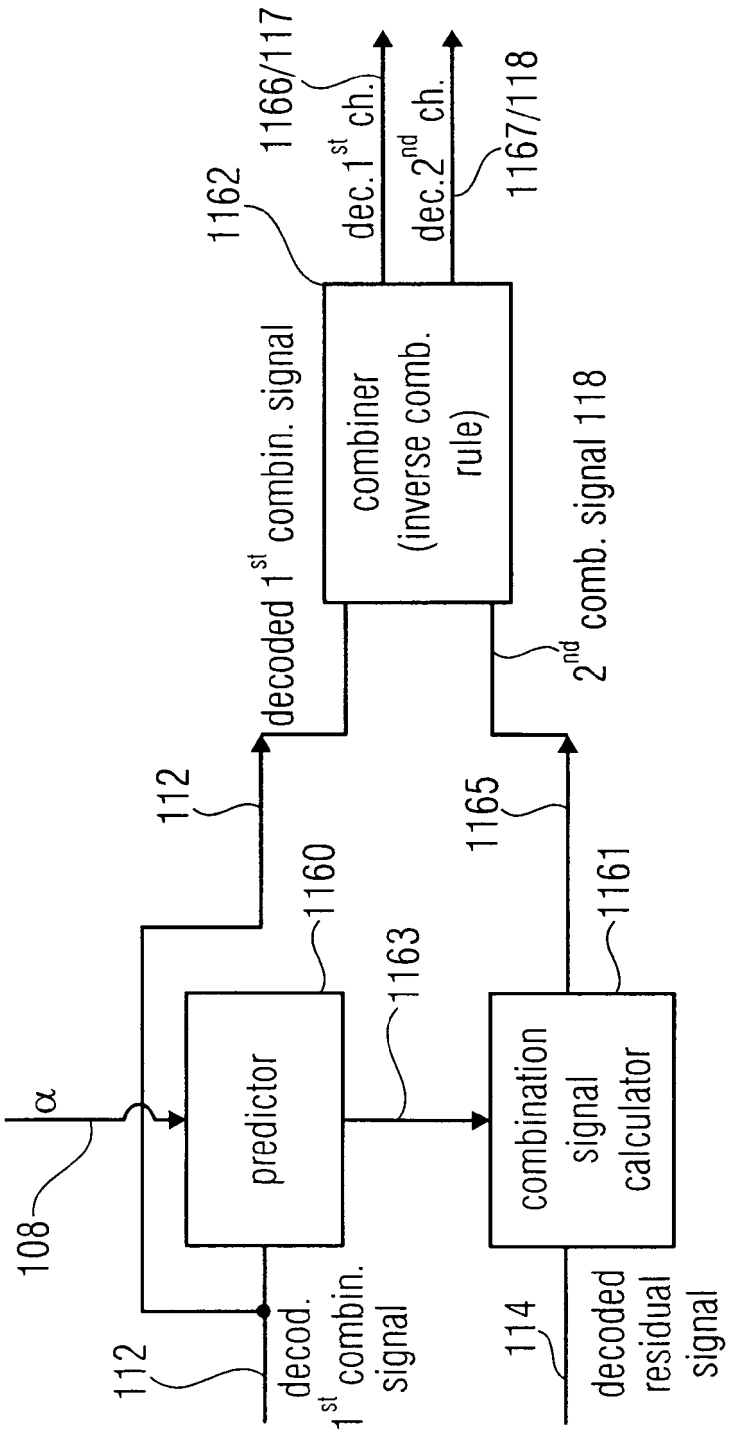


FIG 4A
(AUDIO DECODER SIDE)

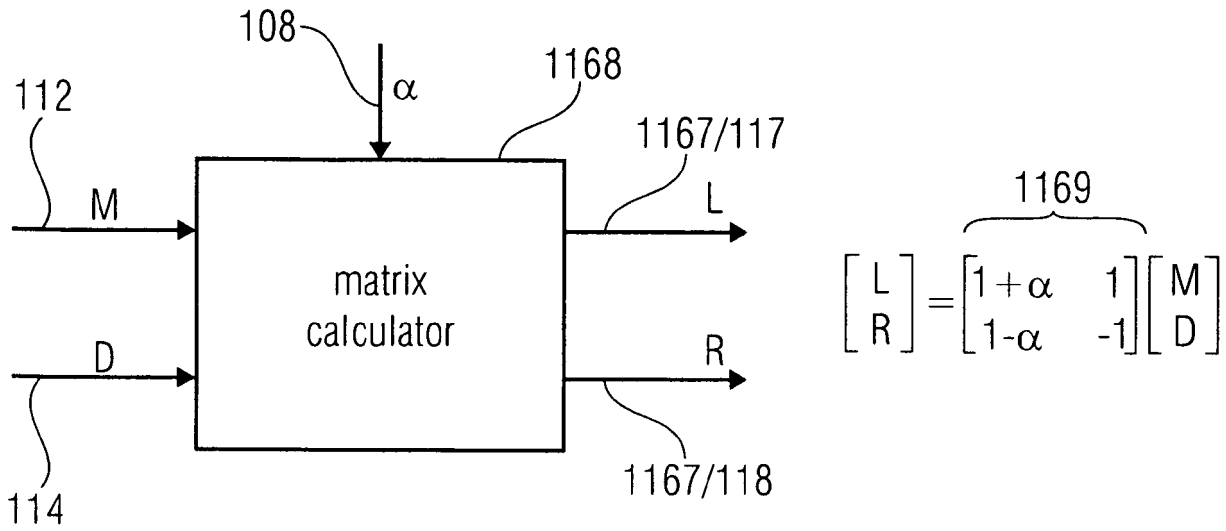


FIG 4B
(AUDIO DECODER SIDE)

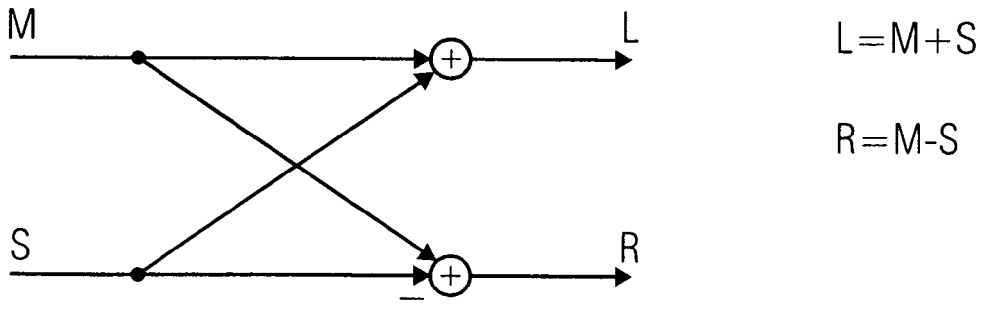


FIG 4C
(INVERSE COMBINATION RULE)

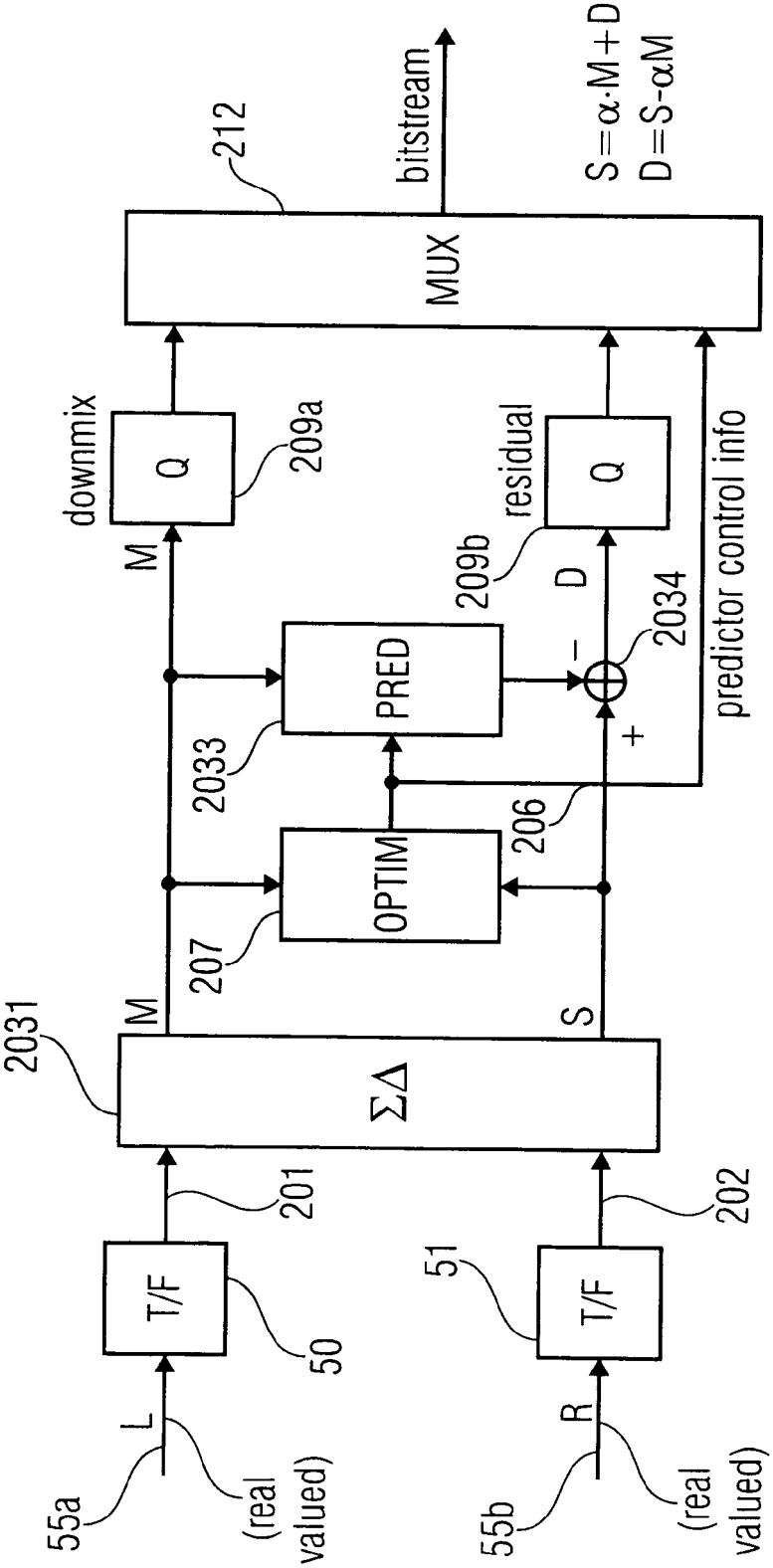


FIG 5A
(ENCODER SIDE)

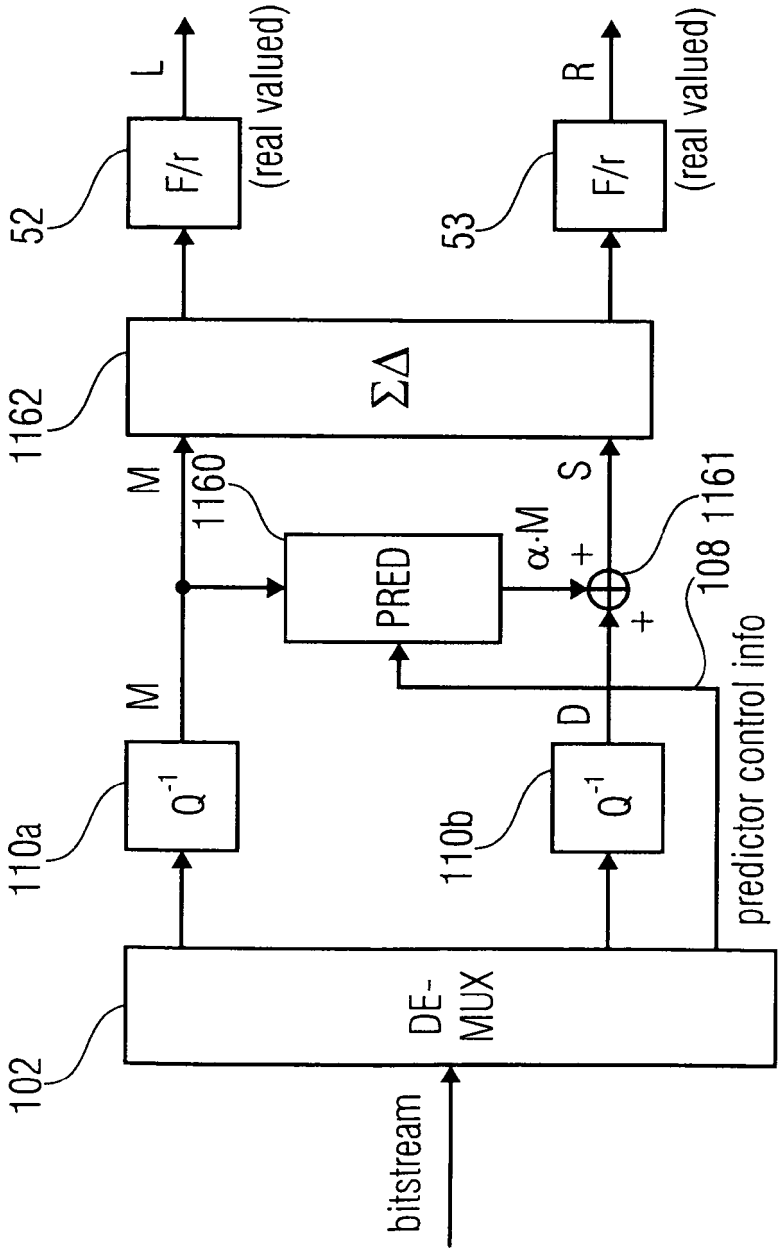


FIG 5B
(DECODER SIDE)

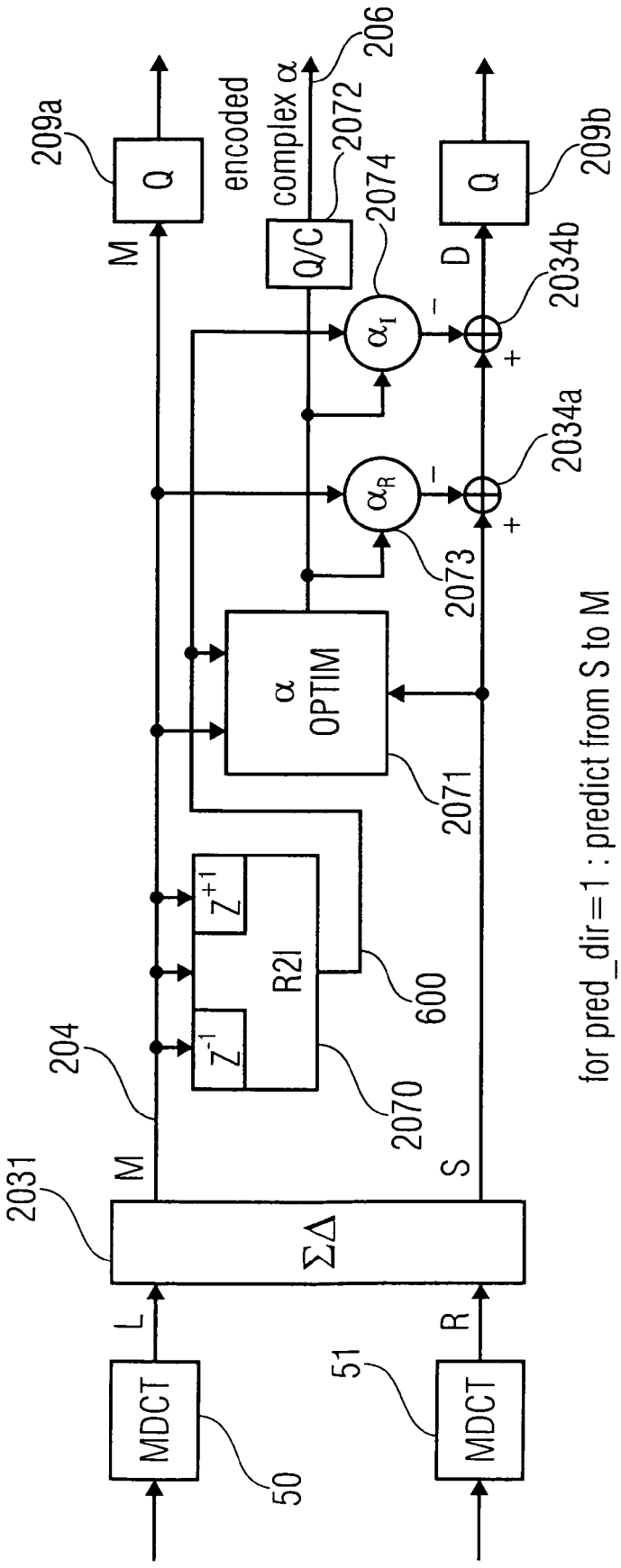


FIG 6A
(ENCODER SIDE)

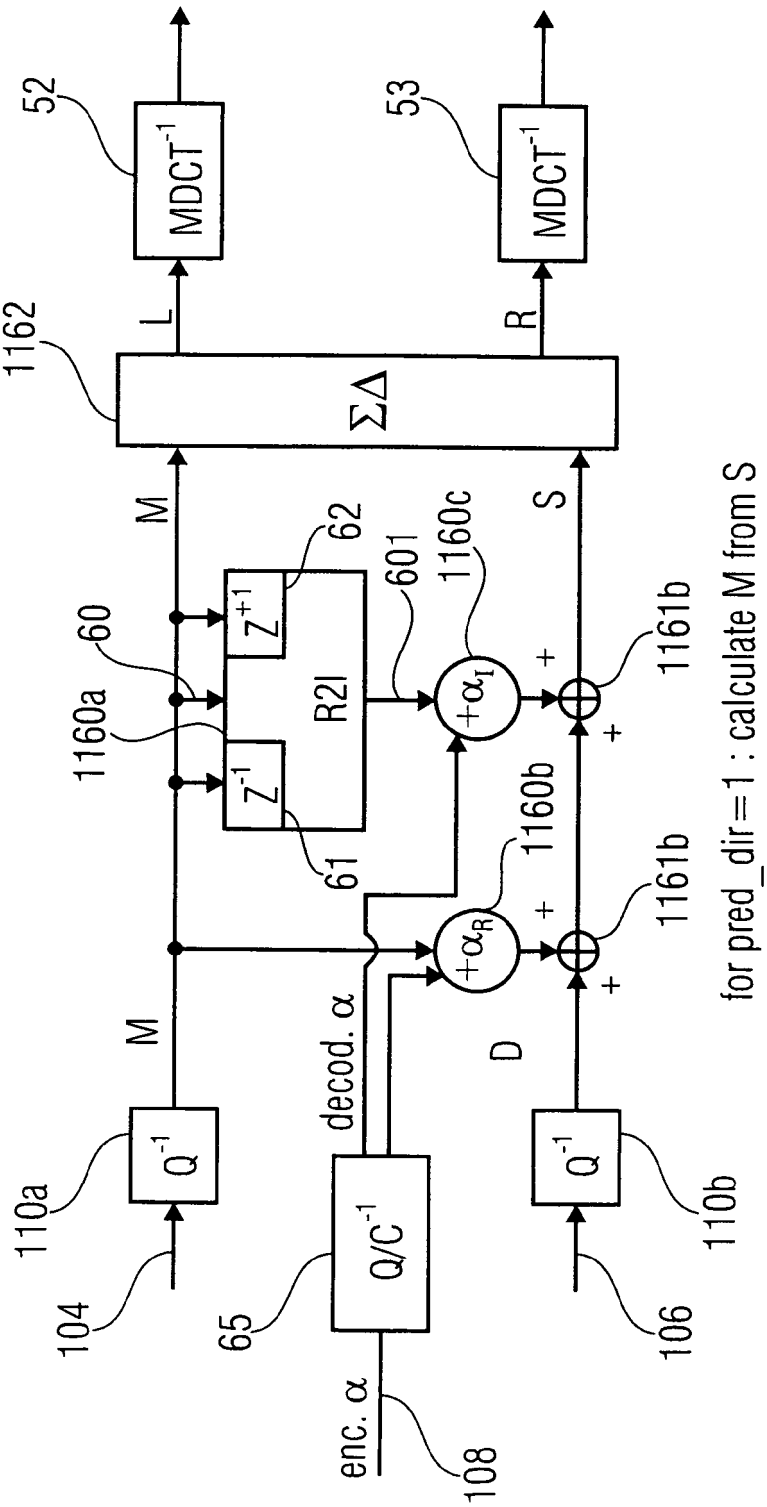


FIG 6B
(DECODER SIDE)

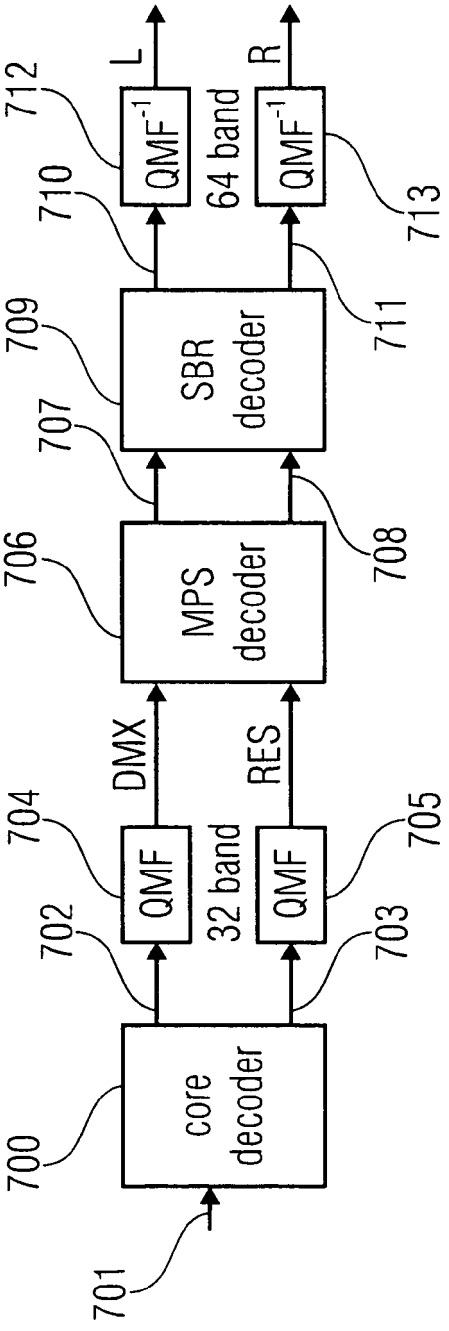


FIG 7A

$$\begin{bmatrix} L \\ R \end{bmatrix} = g \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} DMX \\ RES \end{bmatrix}$$

FIG 7B

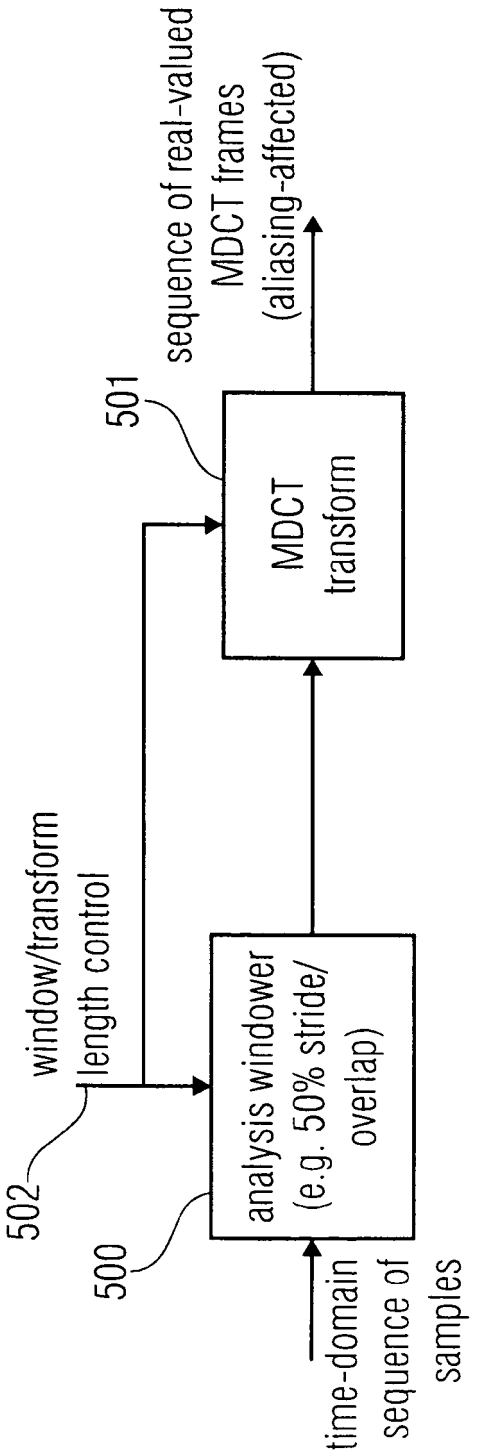

time-domain sequence of samples
analysis windower (e.g. 50% stride/ overlap)
MDCT transform
window/transform length control
sequence of real-valued MDCT frames (aliasing-affected)
500
501
502

FIG 8A

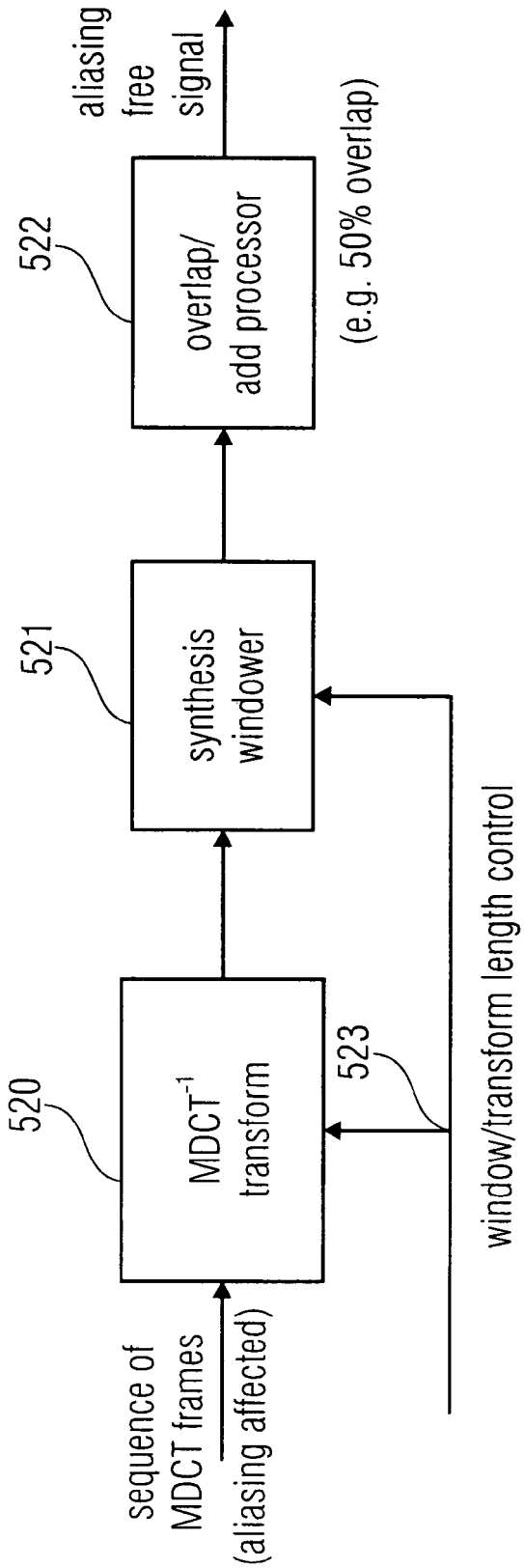
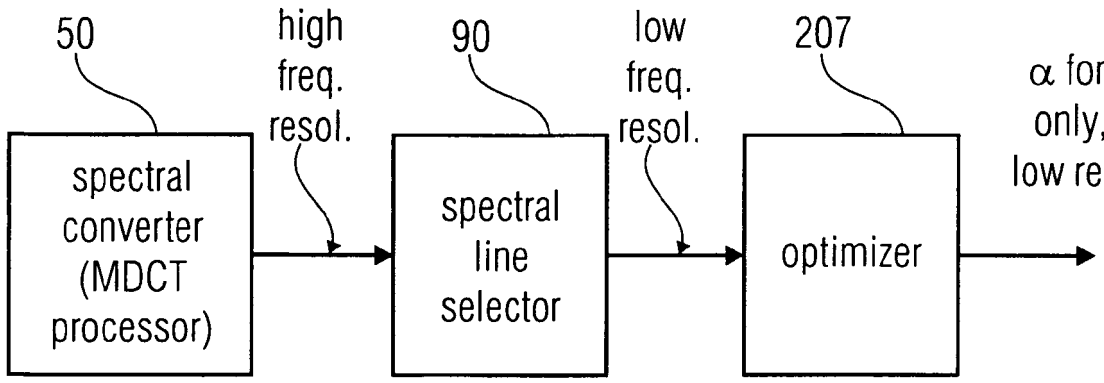
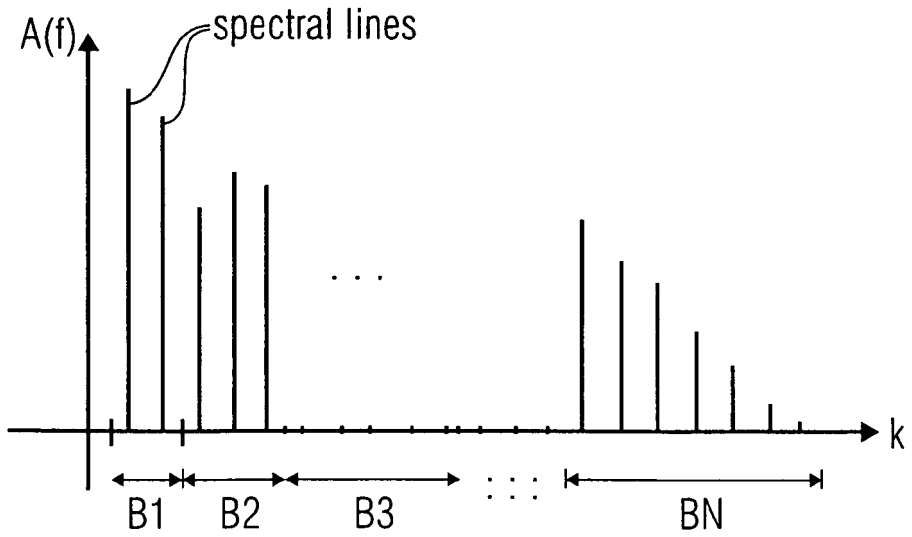

sequence of MDCT frames (aliasing affected)
MDCT-1 transform
synthesis windower
overlap/ add processor
aliasing free signal
(e.g. 50% overlap)
window/transform length control
520
521
522
523

FIG 8B



or: - filter bank with increasing bandwidths
- or equally-sized freq. bands each having at least two spectr. lines

FIG 9A



- only a single α is calculated for each band
  (e.g. -1024 spectral lines;
  - less then 30 complex α-values(e.g.22))
- Bi increase with frequency

FIG 9B

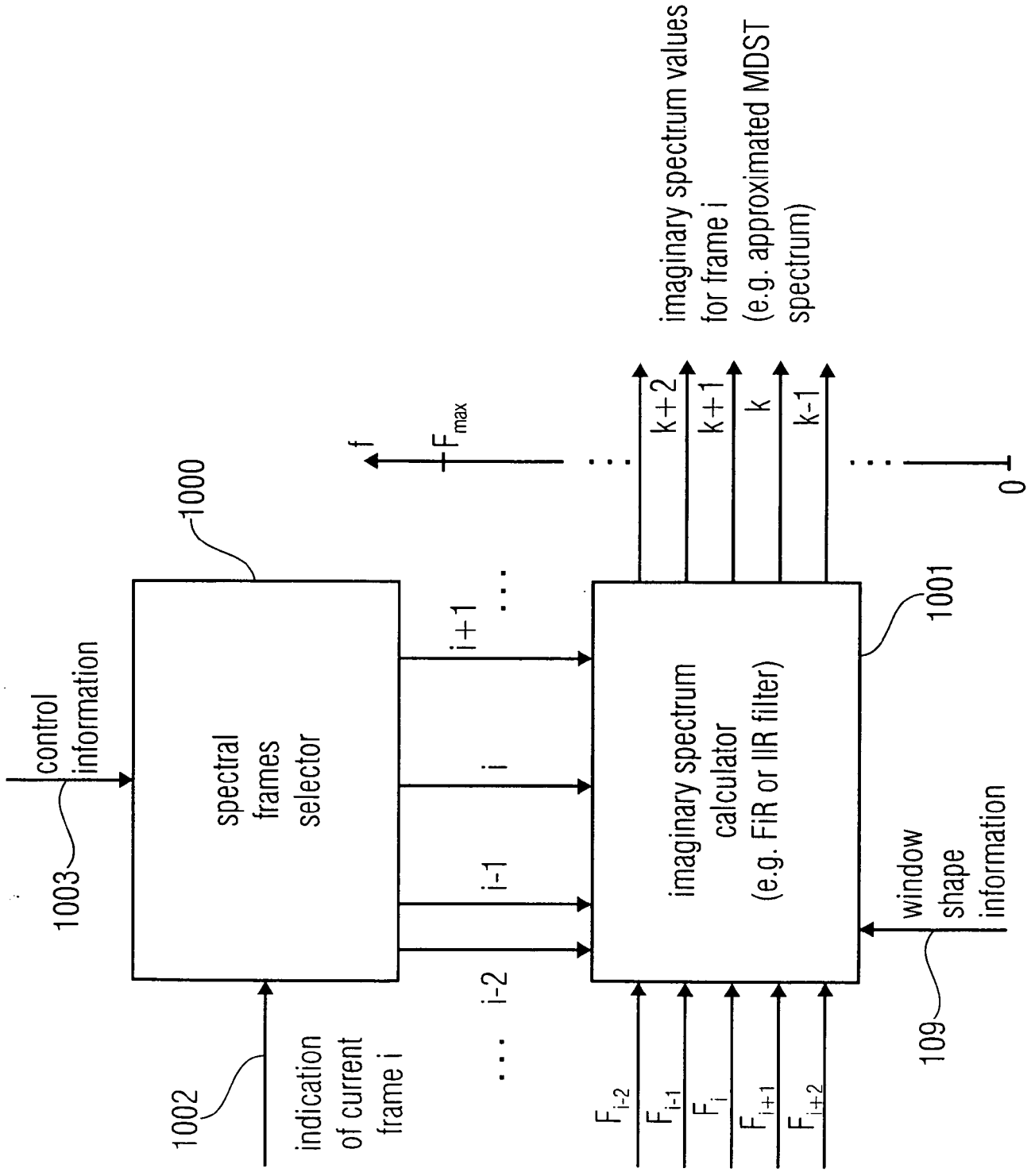

control information
1003
spectral frames selector
1000
indication of current frame i
1002
i+1
i
i-1
i-2
imaginary spectrum calculator (e.g. FIR or IIR filter)
1001
window shape information
109
f
F_{max}
0
k+2
k+1
k
k-1
imaginary spectrum values for frame i (e.g. approximated MDST spectrum)
F_{i-2}
F_{i-1}
F_i
F_{i+1}
F_{i+2}

FIG 10A

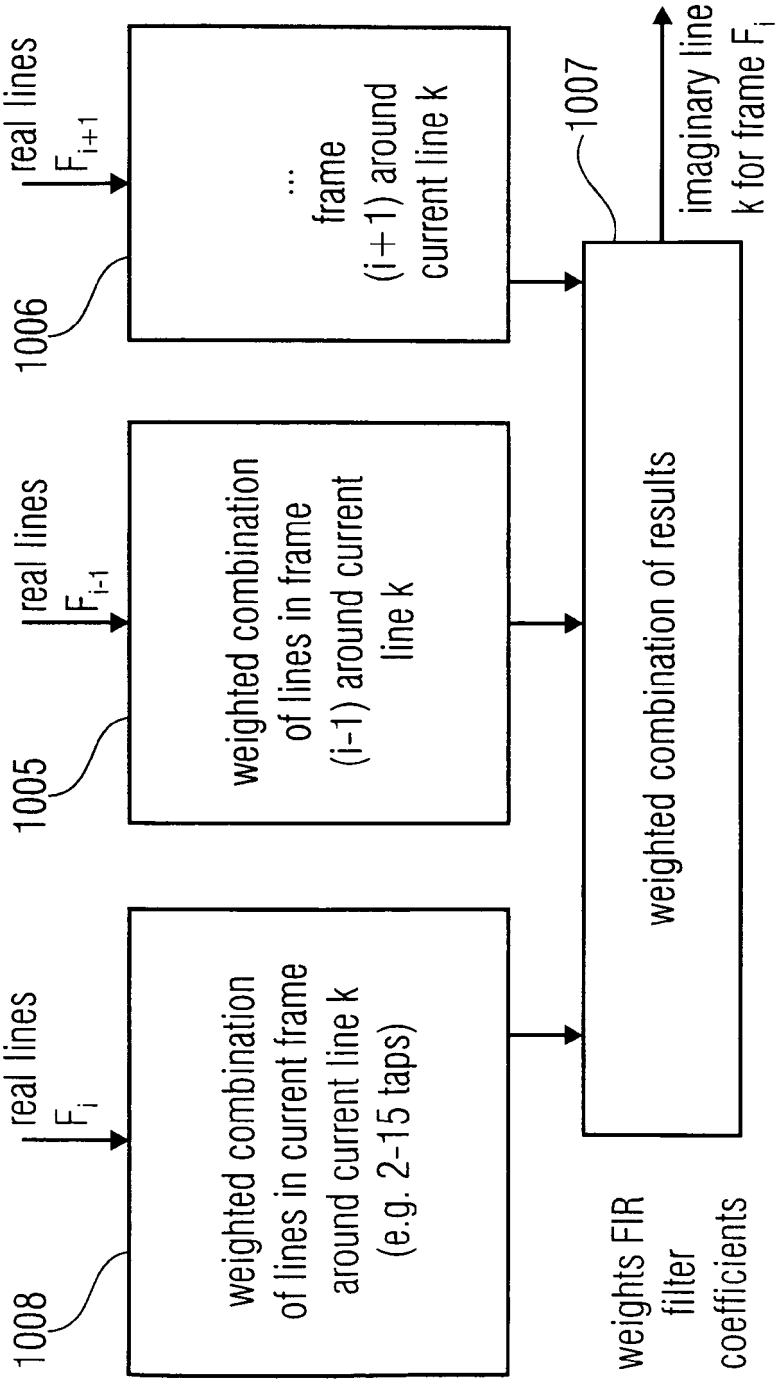

real lines
F_{i+1}
1006
...
frame
(i+1) around
current line k
real lines
F_{i-1}
1005
weighted combination
of lines in frame
(i-1) around current
line k
real lines
F_i
1008
weighted combination
of lines in current frame
around current line k
(e.g. 2-15 taps)
weights FIR
filter
coefficients
weighted combination of results
1007
imaginary line
k for frame F_i

FIG 10B

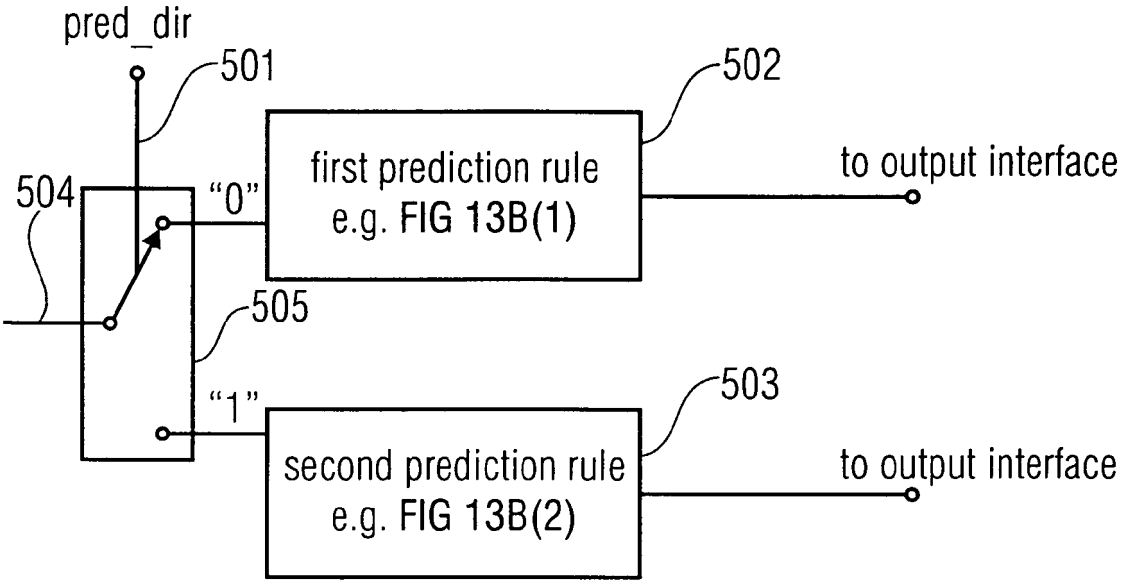


FIG 11A
(ENCODER SIDE)

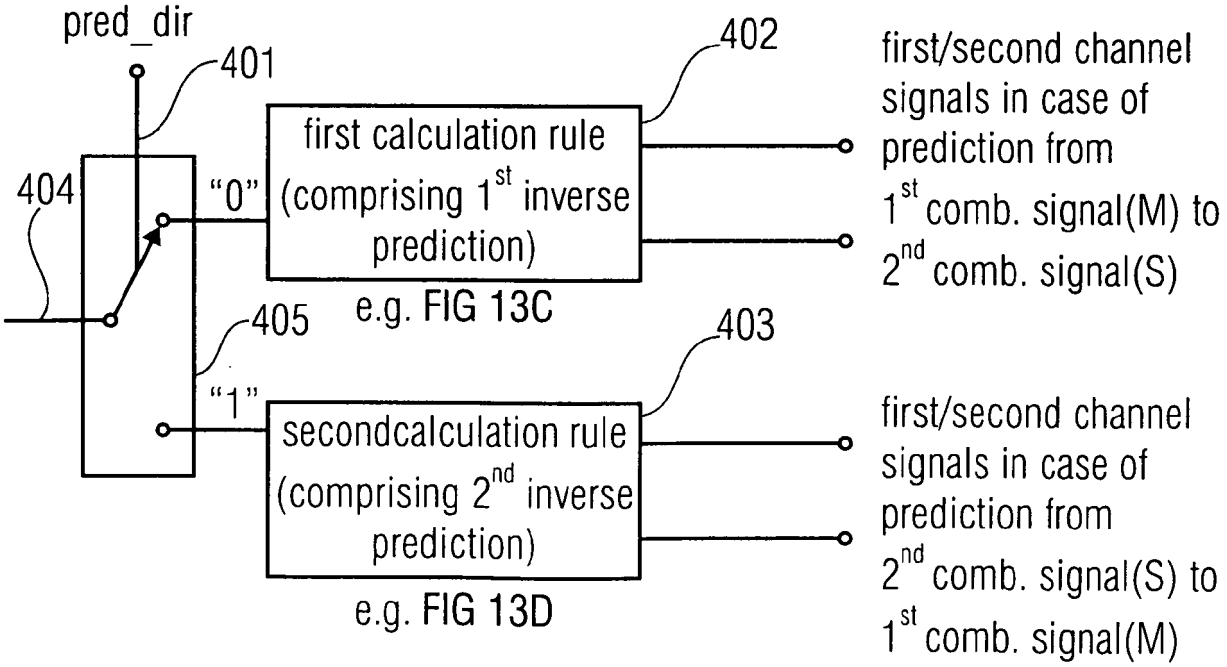


FIG 11B
(DECODER SIDE)

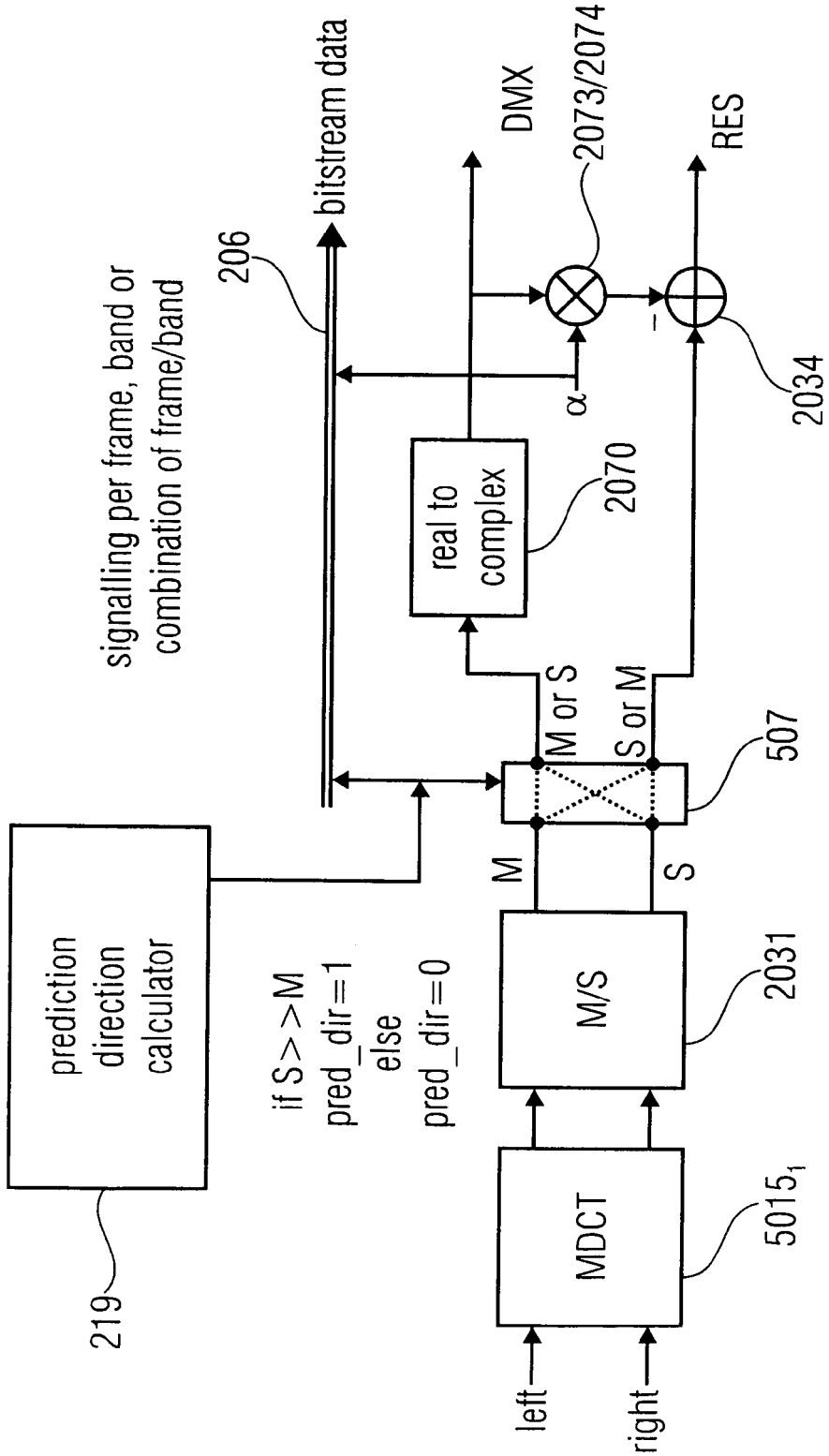


FIG 12A
(ENCODER SIDE)

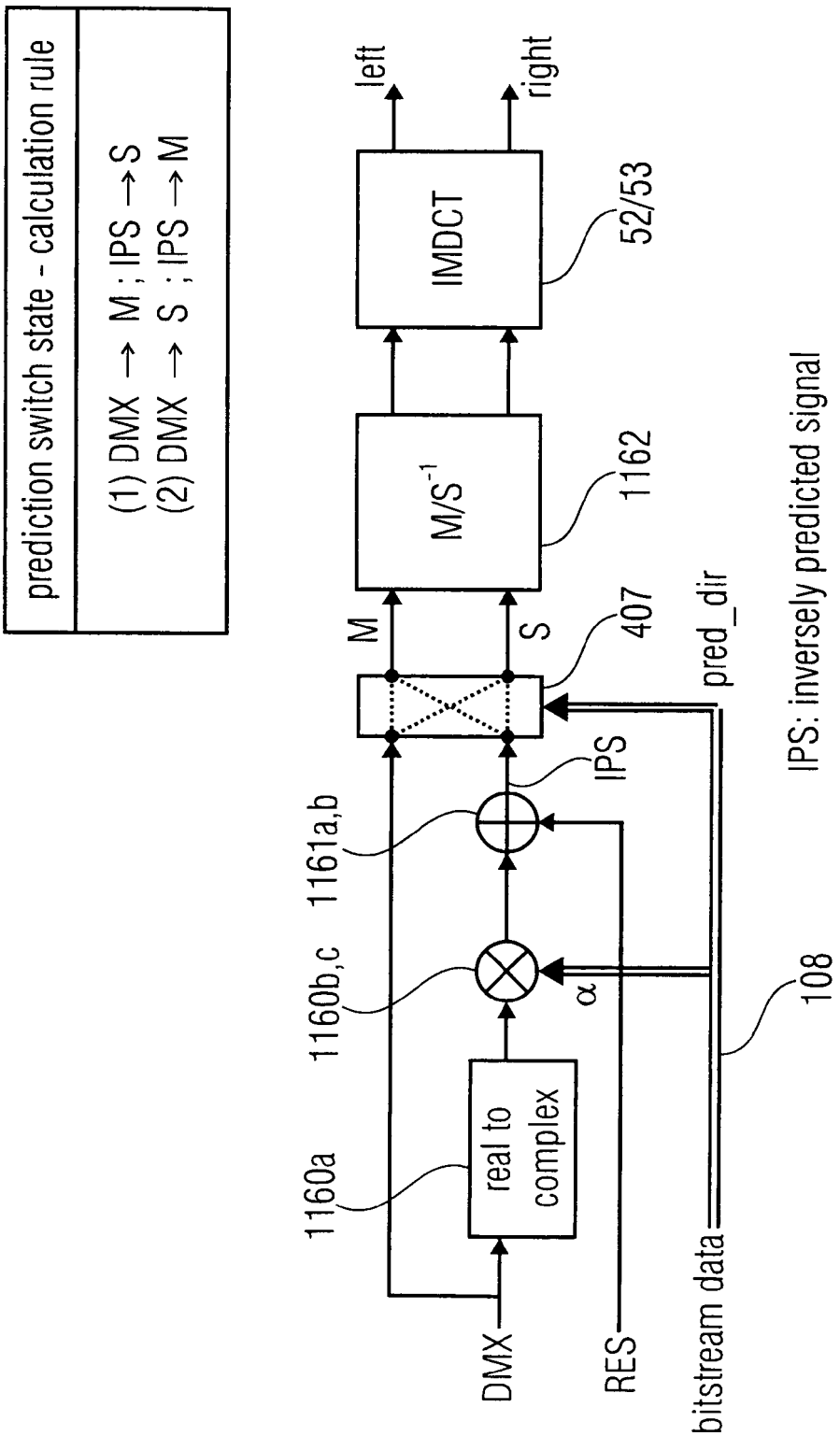


FIG 12B
(DECODER SIDE)

FIG 13A

pred_dir indicates the direction of prediction according to:

pred_dir	meaning
0	prediction from mid to side channel
1	prediction from side to mid channel

FIG 13B

(1) pred_dir=0 : RES = (S - α·M); transmit: M, RES, α

(2) pred_dir=1 : RES = (M - α·S); transmit: S, RES, α

NOTE: sign of α can be reversed in all equations.

FIG 13C

pred_dir=0:

explicit inverse prediction: $S=RES+\alpha\cdot M;$ $L=\frac{1}{2}(M+S)$ $R=\frac{1}{2}(M-S)$

implicit inverse prediction: $L=\frac{1}{2}[M(1-\alpha)+RES]$

$R=\frac{1}{2}[M(1+\alpha)1RES]$

FIG 13D

pred_dir=1:

explicit inverse prediction: $M=RES+\alpha\cdot M;$ $L=\frac{1}{2}(M+S)$ $R=\frac{1}{2}(M-S)$

implicit inverse prediction: $L=\frac{1}{2}[S(\alpha+1)+RES]$

$R=\frac{1}{2}[S(\alpha-1)+RES]$

$$\alpha \cdot M \mathrel{\hat{=}} \alpha_{Re} \cdot M_{Re} - {}_{Im} \cdot M_{Im}$$

$$(1+\alpha) \cdot M \mathrel{\hat{=}} (1+\alpha_{Re}) \cdot M_{Re} - {}_{Im} \cdot M_{Im}$$

complex products, if α is complex

FIG 13E

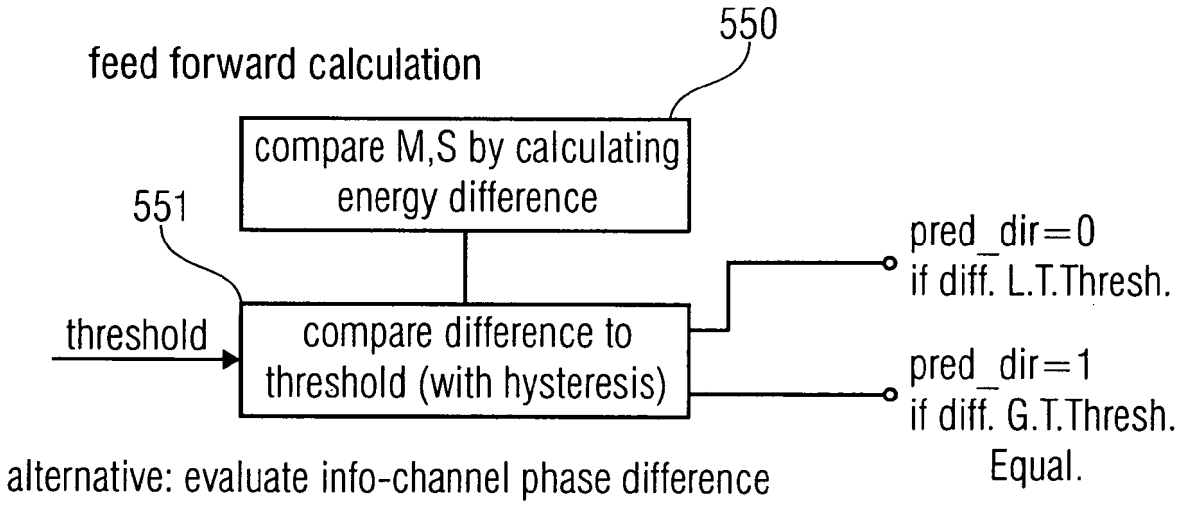


FIG 14A

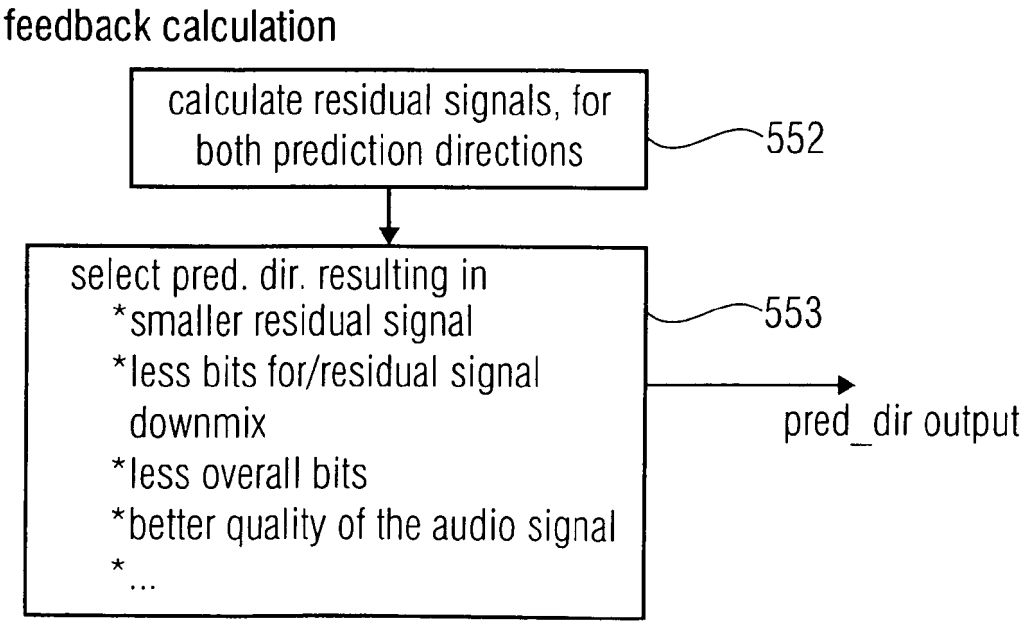


FIG 14B