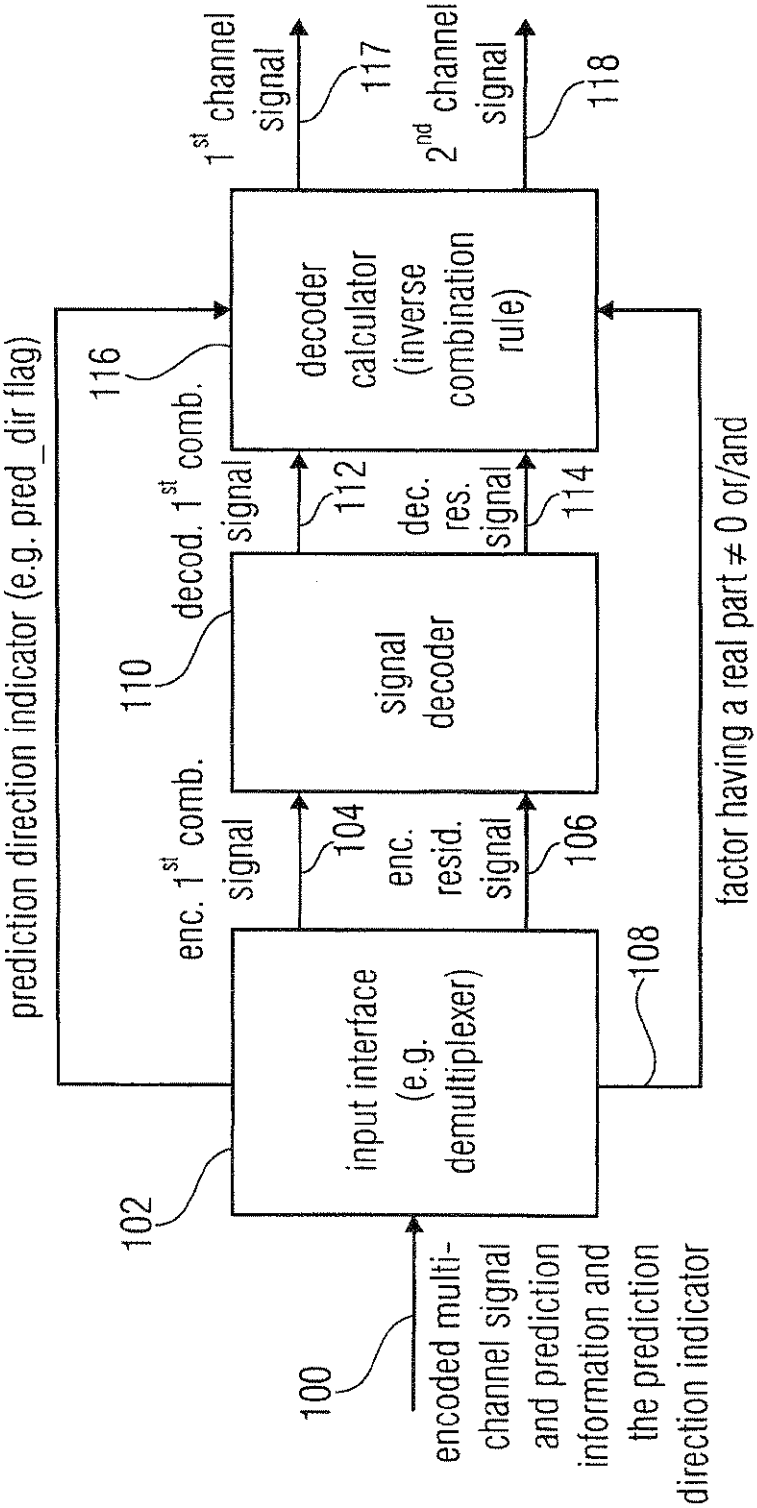


FIG 1
(AUDIO DECODER)

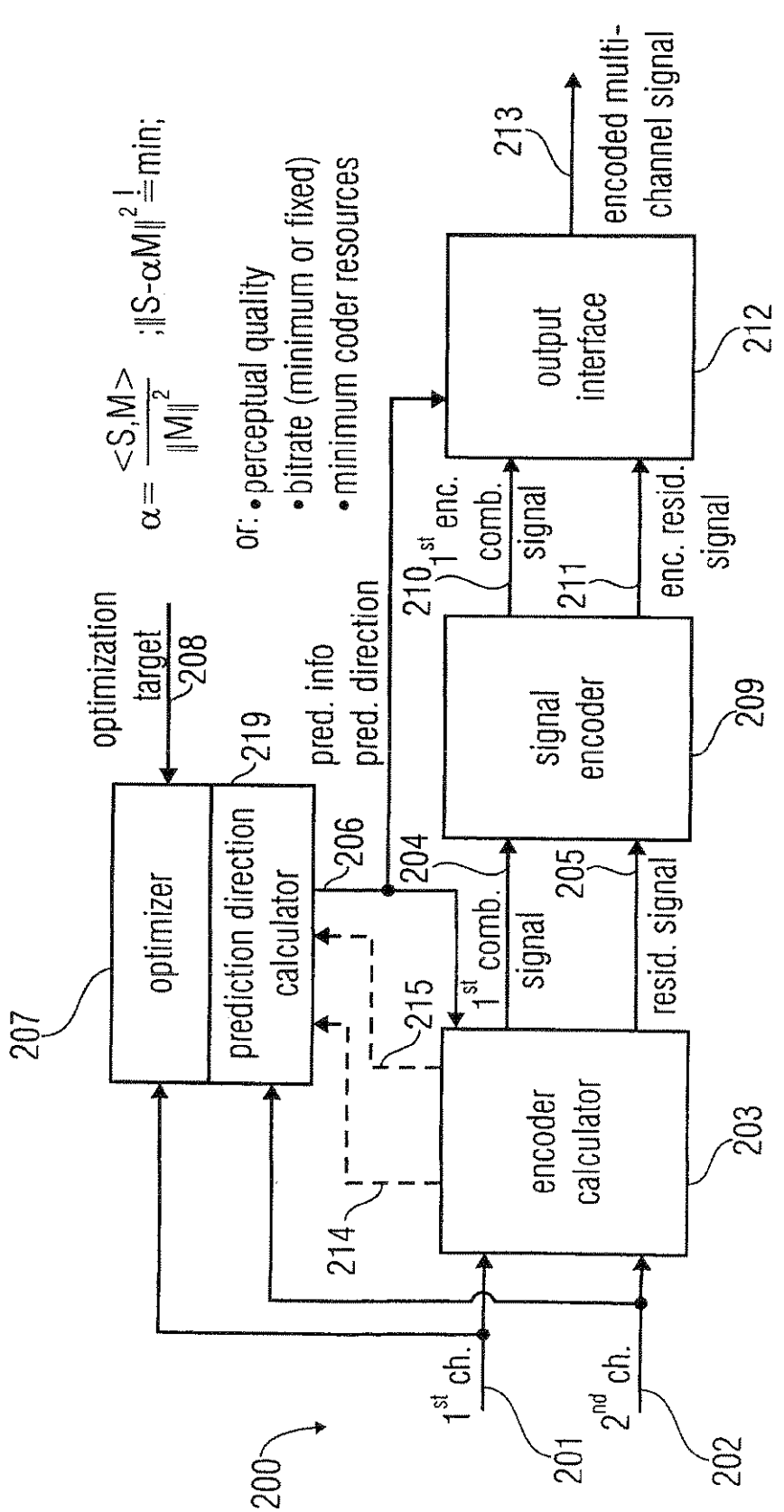


FIG 2
(AUDIO ENCODER)

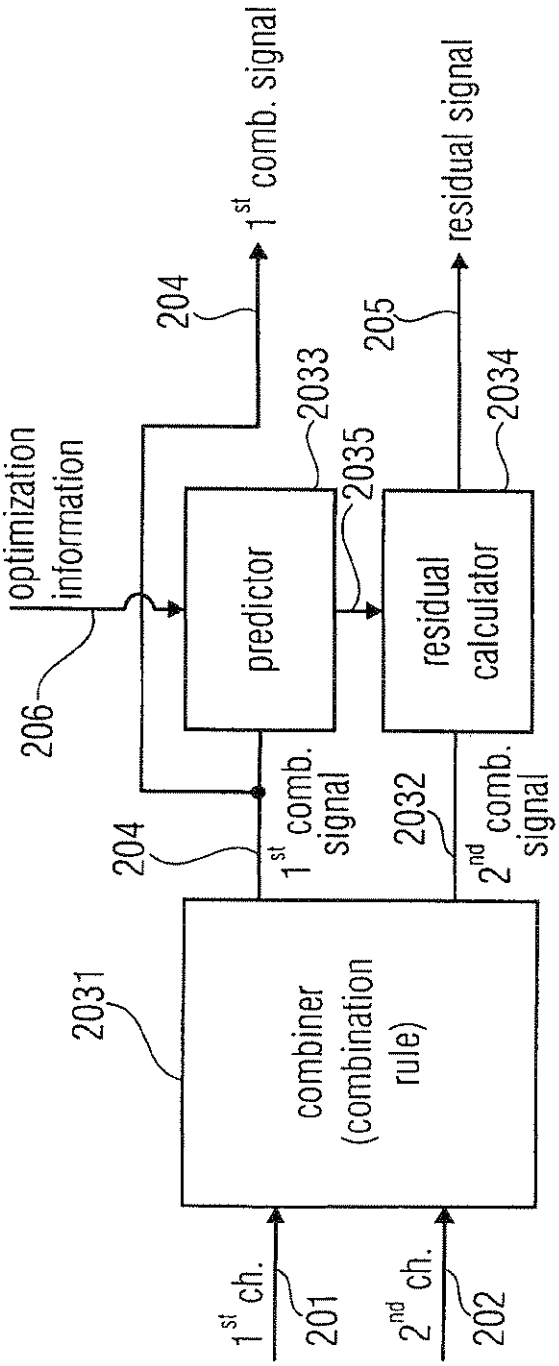
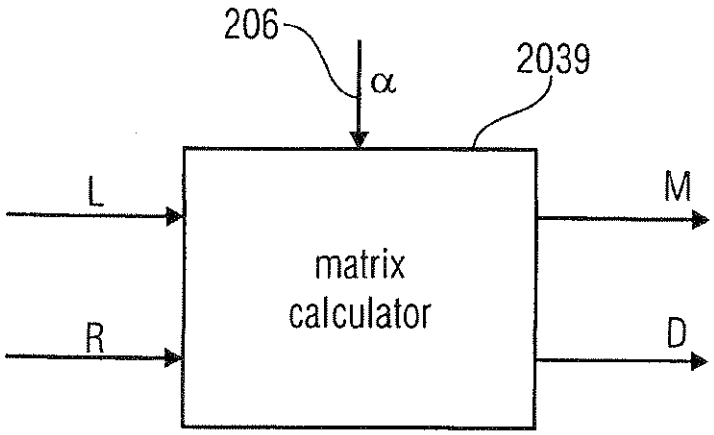


FIG 3A
(AUDIO ENCODER SIDE)



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

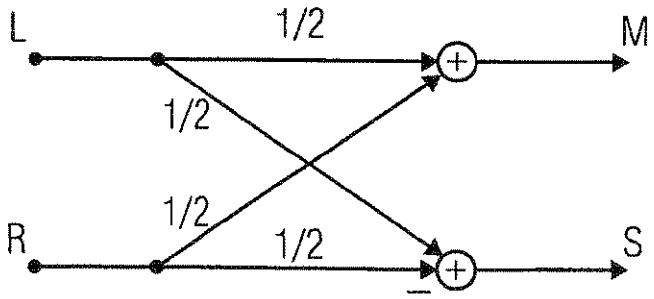
$$\alpha = |\alpha| \cdot e^{j\varphi\alpha} \quad \alpha$$

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)

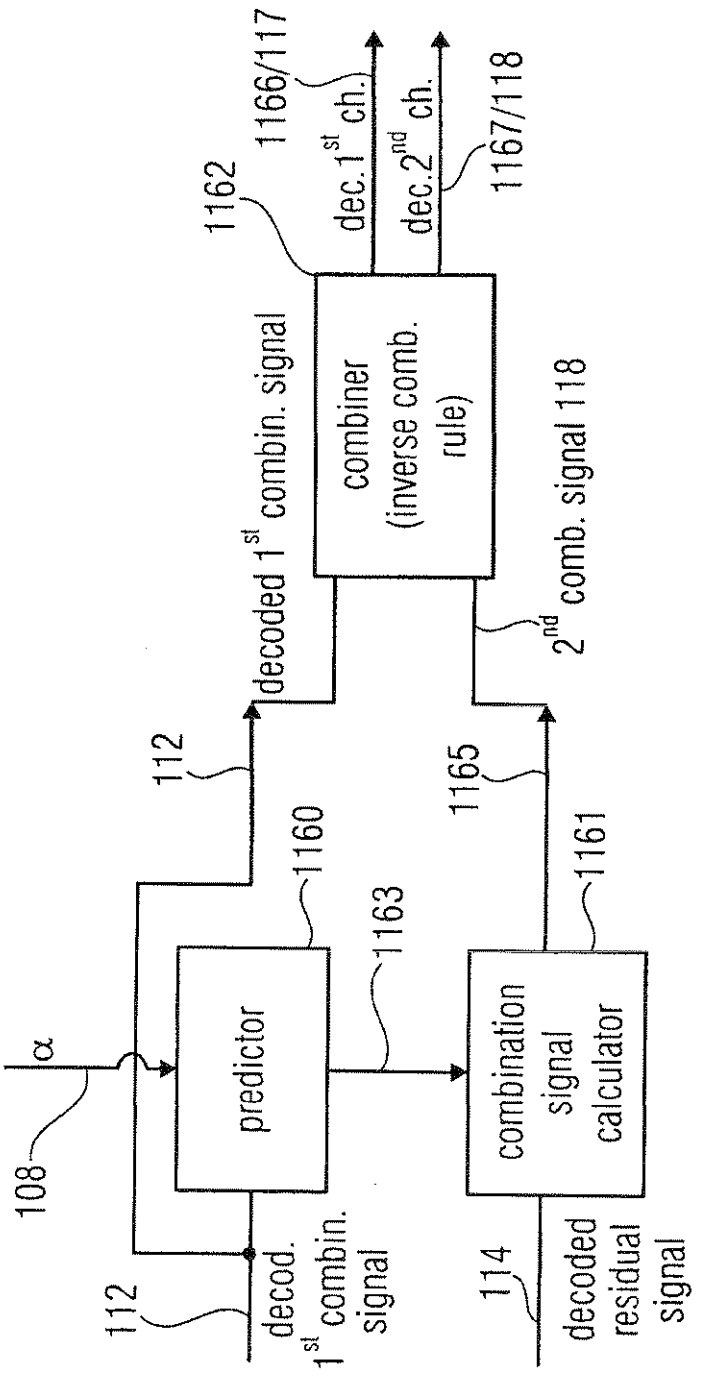


FIG 4A
(AUDIO DECODER SIDE)

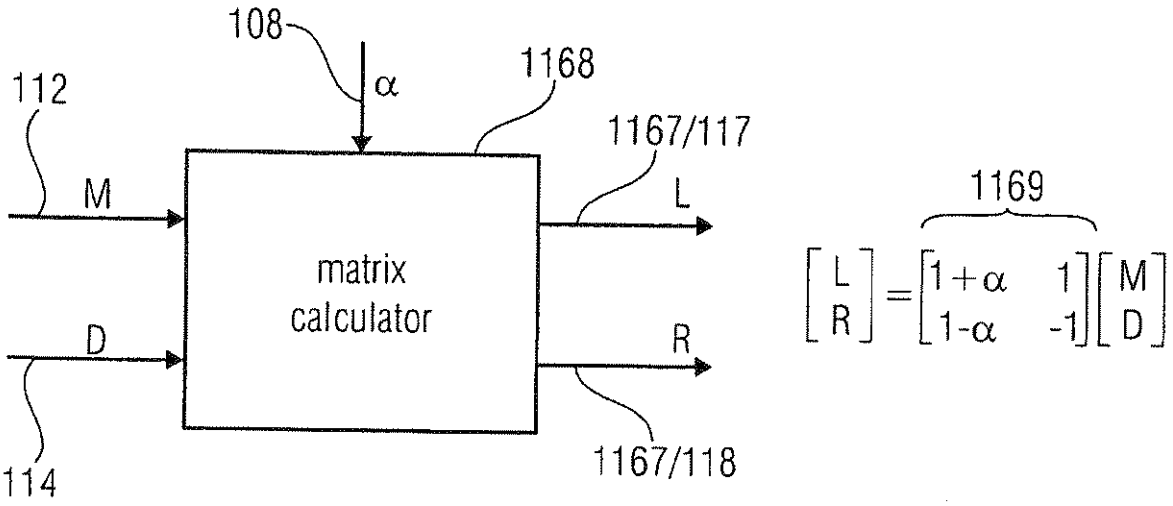


FIG 4B
(AUDIO DECODER SIDE)

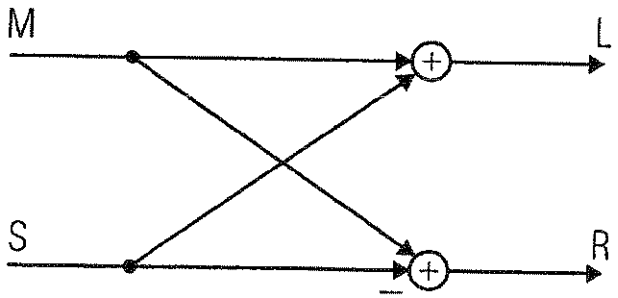


FIG 4C
(INVERSE COMBINATION RULE)

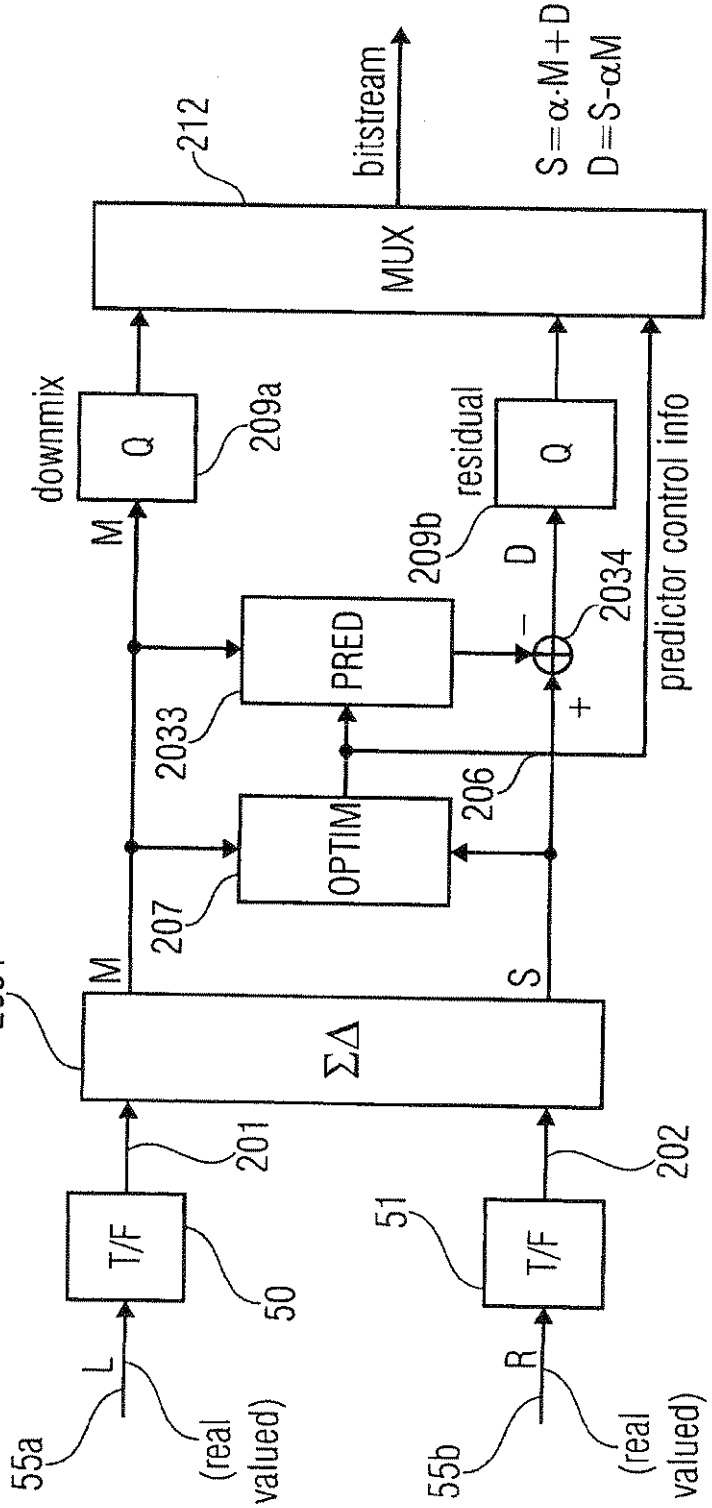


FIG 5A
(ENCODER SIDE)

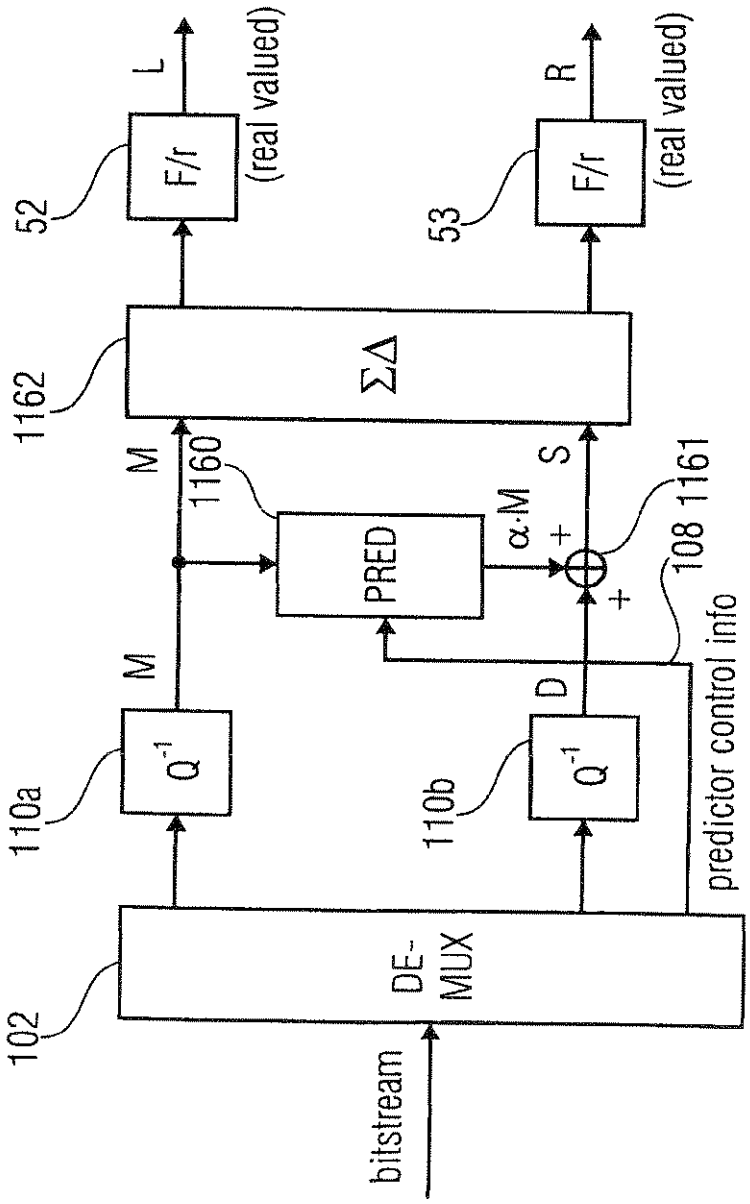


FIG 5B
(DECODER SIDE)

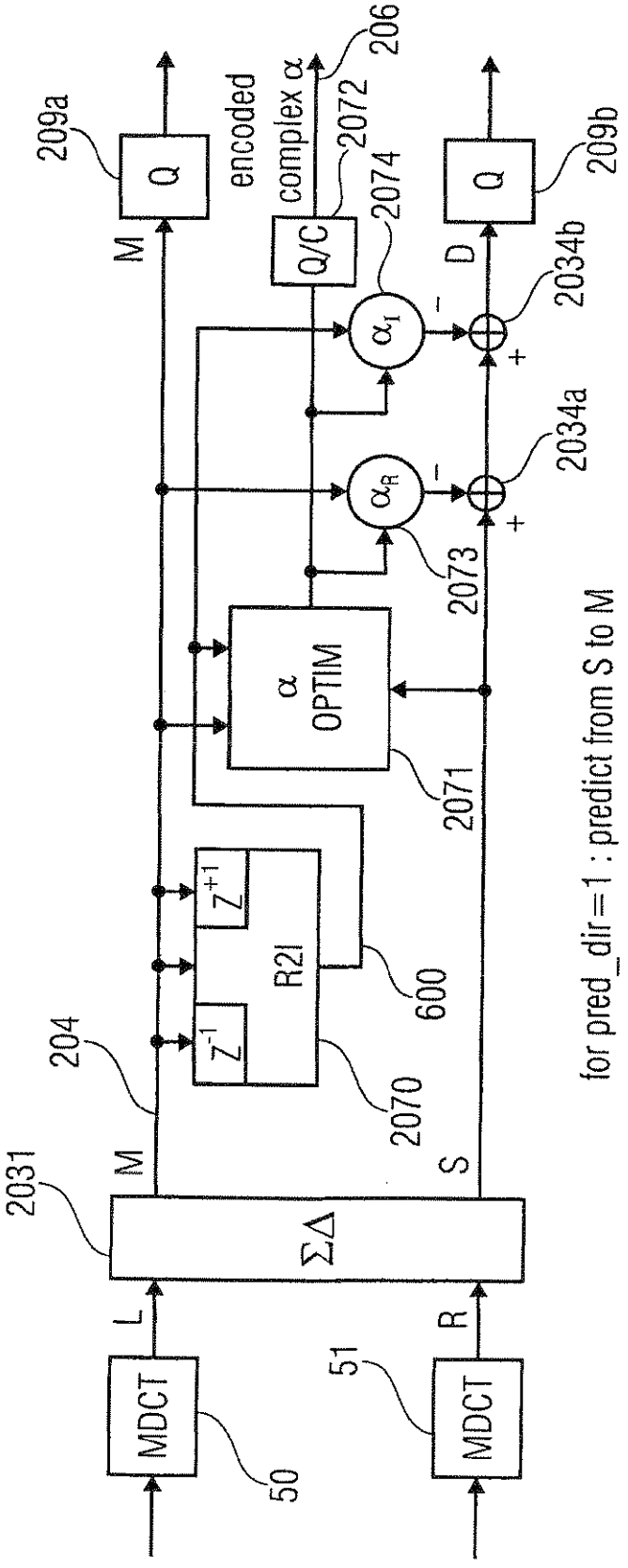


FIG 6A
(ENCODER SIDE)

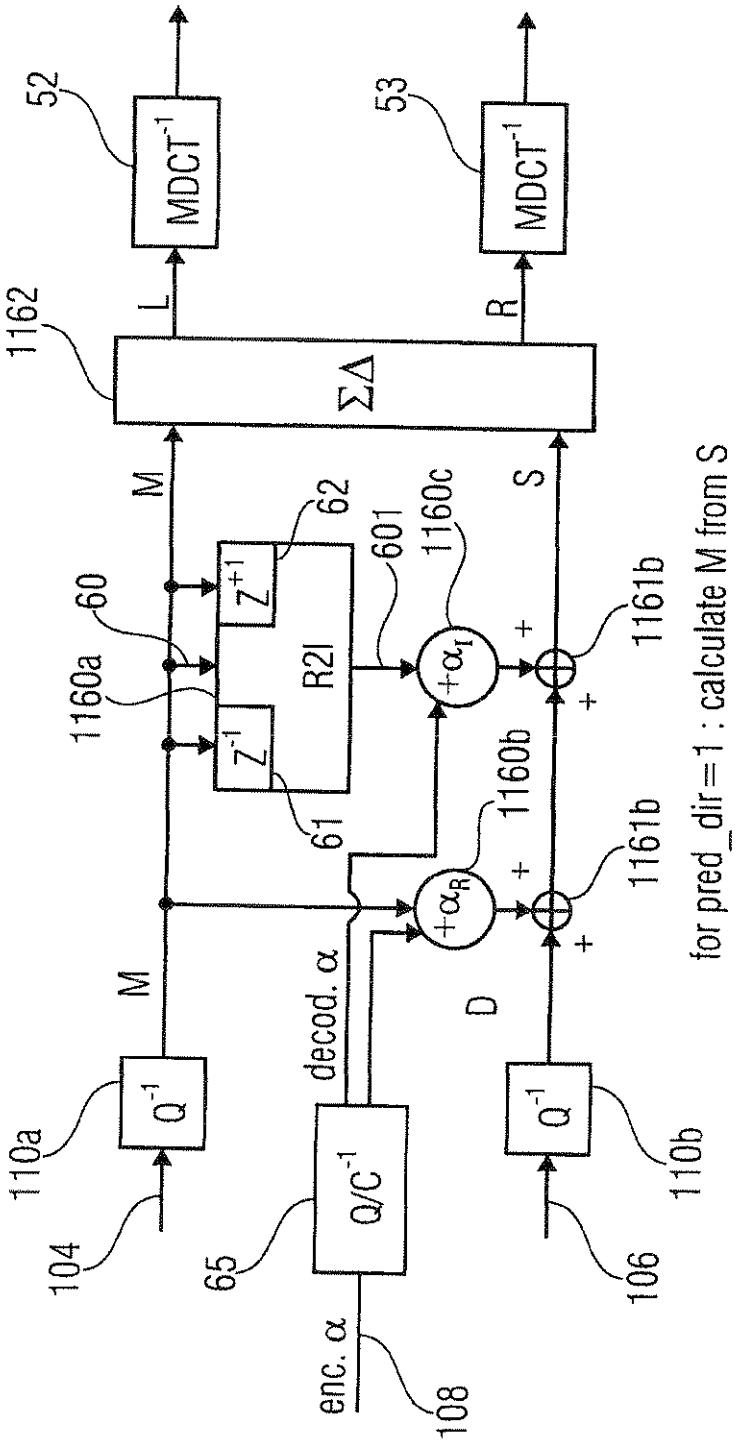


FIG 6B
(DECODER SIDE)

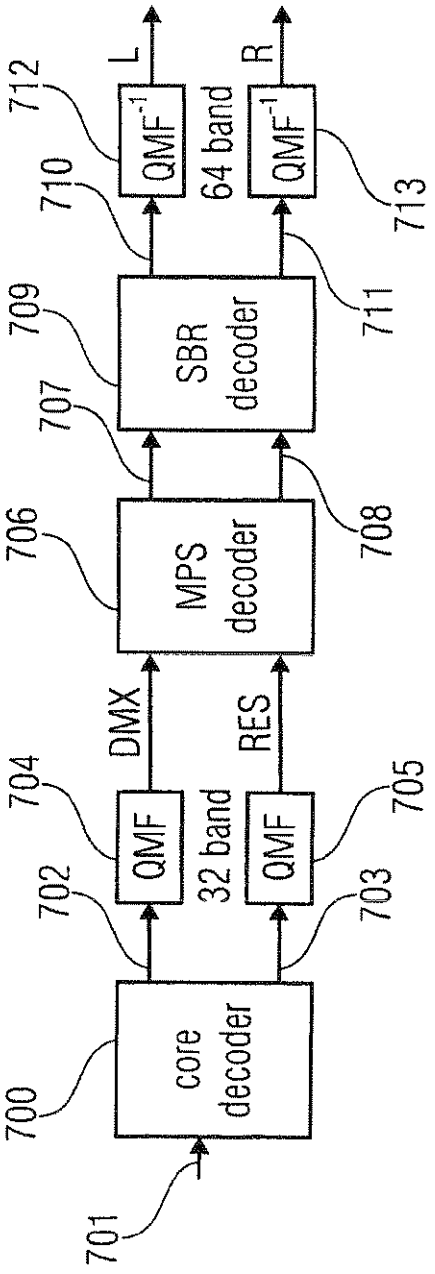


FIG 7A

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

FIG 7B

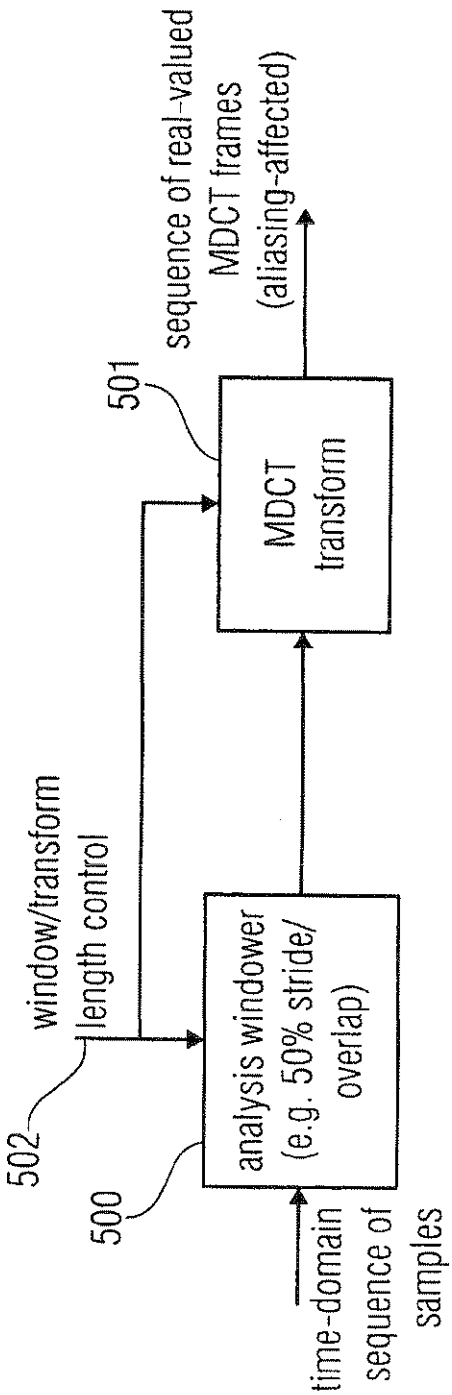

time-domain sequence of samples
500
analysis windower (e.g. 50% stride/ overlap)
502
window/transform length control
501
MDCT transform
sequence of real-valued MDCT frames (aliasing-affected)

FIG 8A

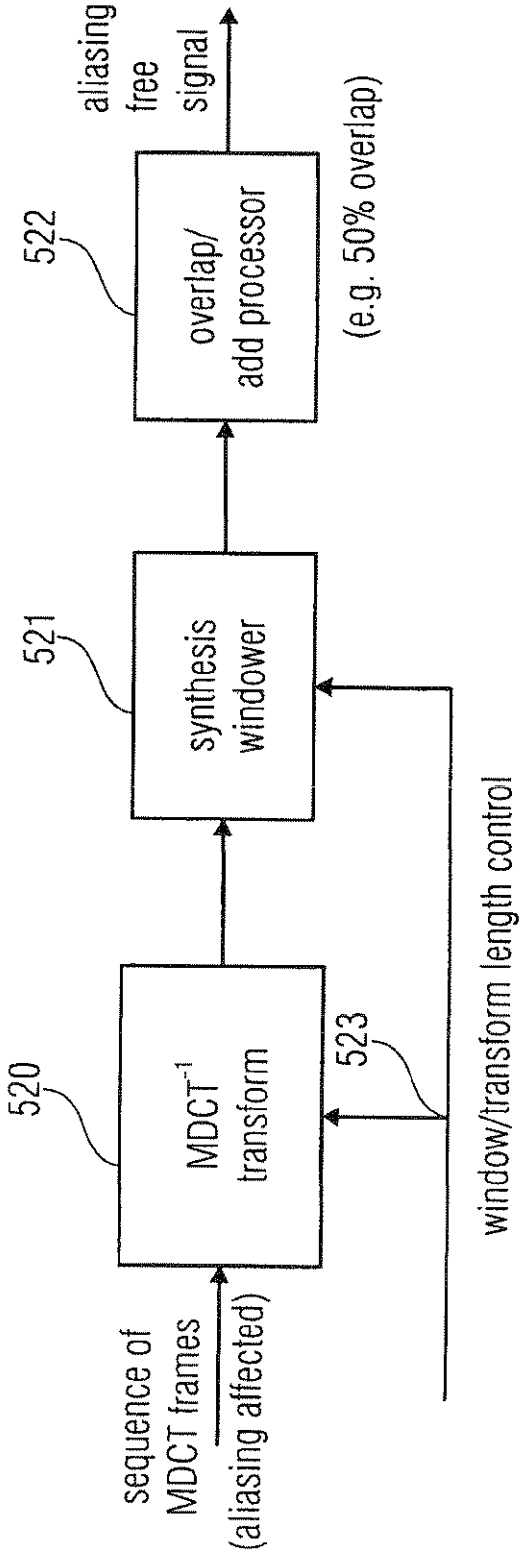
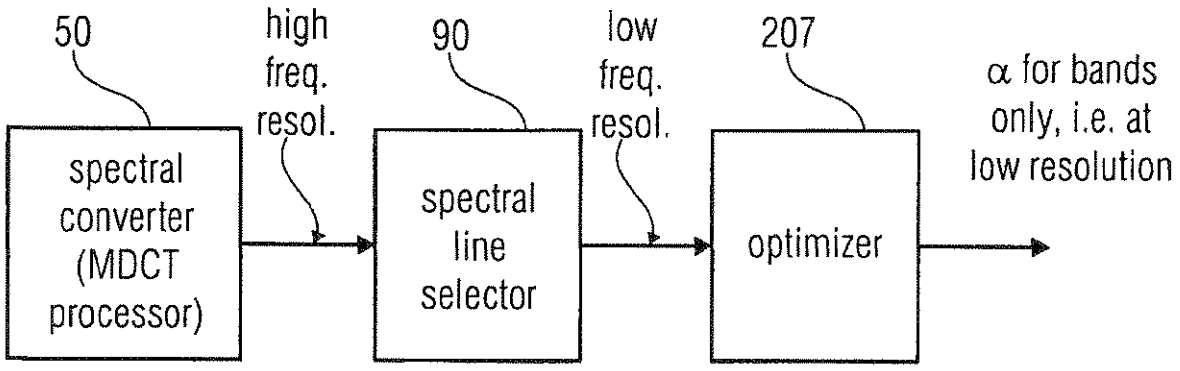
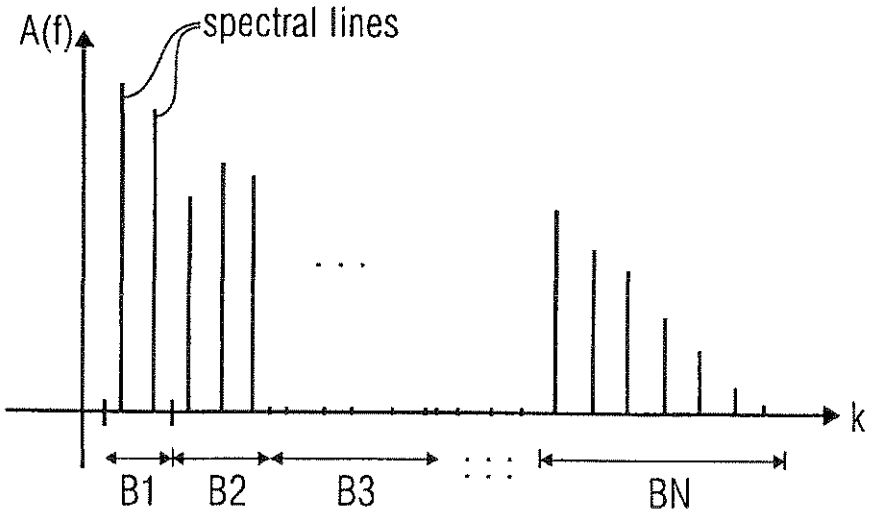

sequence of MDCT frames (aliasing affected)
520
MDCT^{-1} transform
523
window/transform length control
521
synthesis windower
522
overlap/ add processor
(e.g. 50% overlap)
aliasing free signal

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

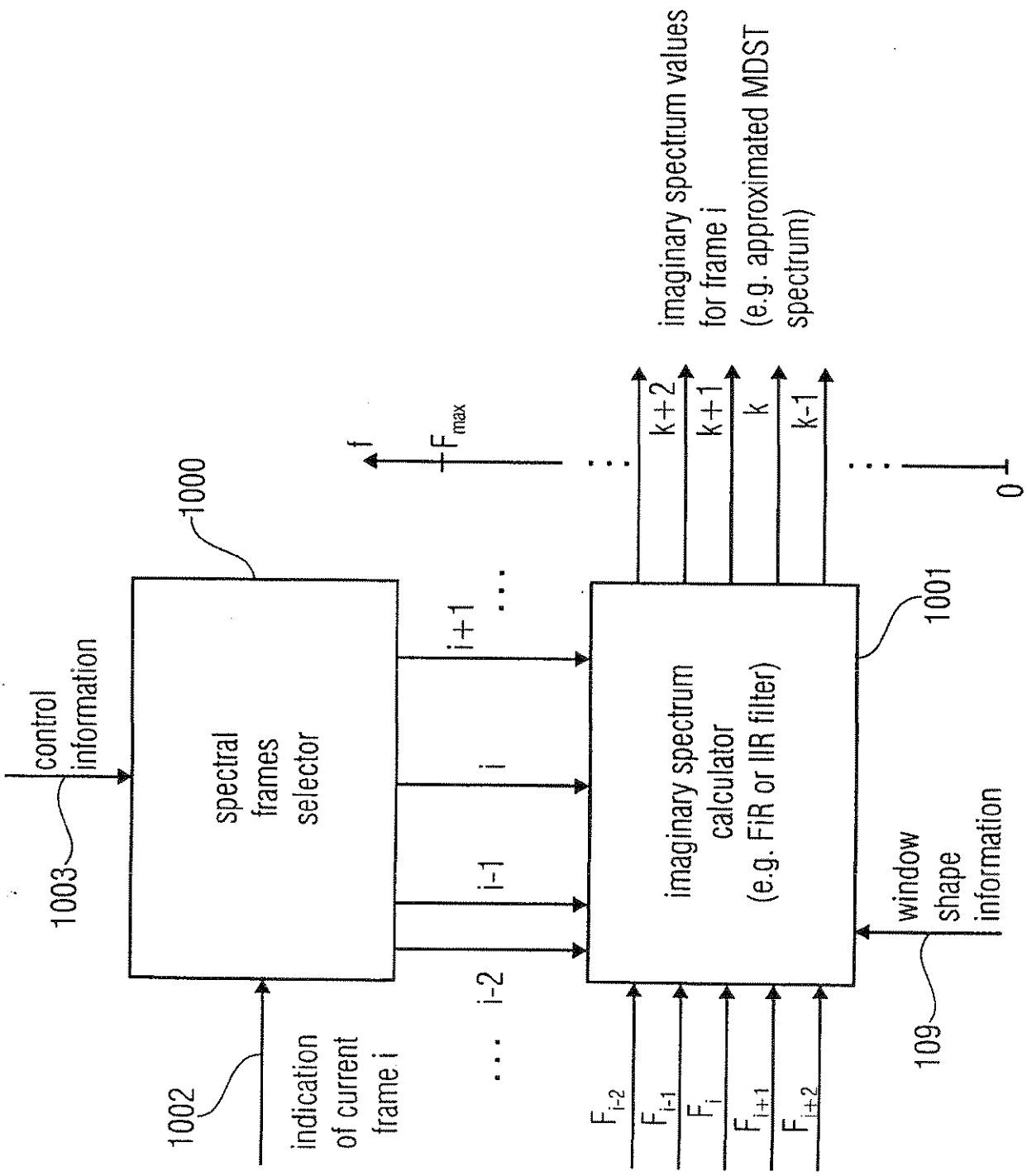

control information
1003
spectral frames selector
1000
indication of current frame i
1002
i+1
i
i-1
i-2
imaginary spectrum calculator (e.g. FIR or IIR filter)
1001
window shape information
109
f
F_{max}
0
k+2
k+1
k
k-1
imaginary spectrum values for frame i (e.g. approximated MDST spectrum)
F_{i-2}
F_{i-1}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

FIG 10A

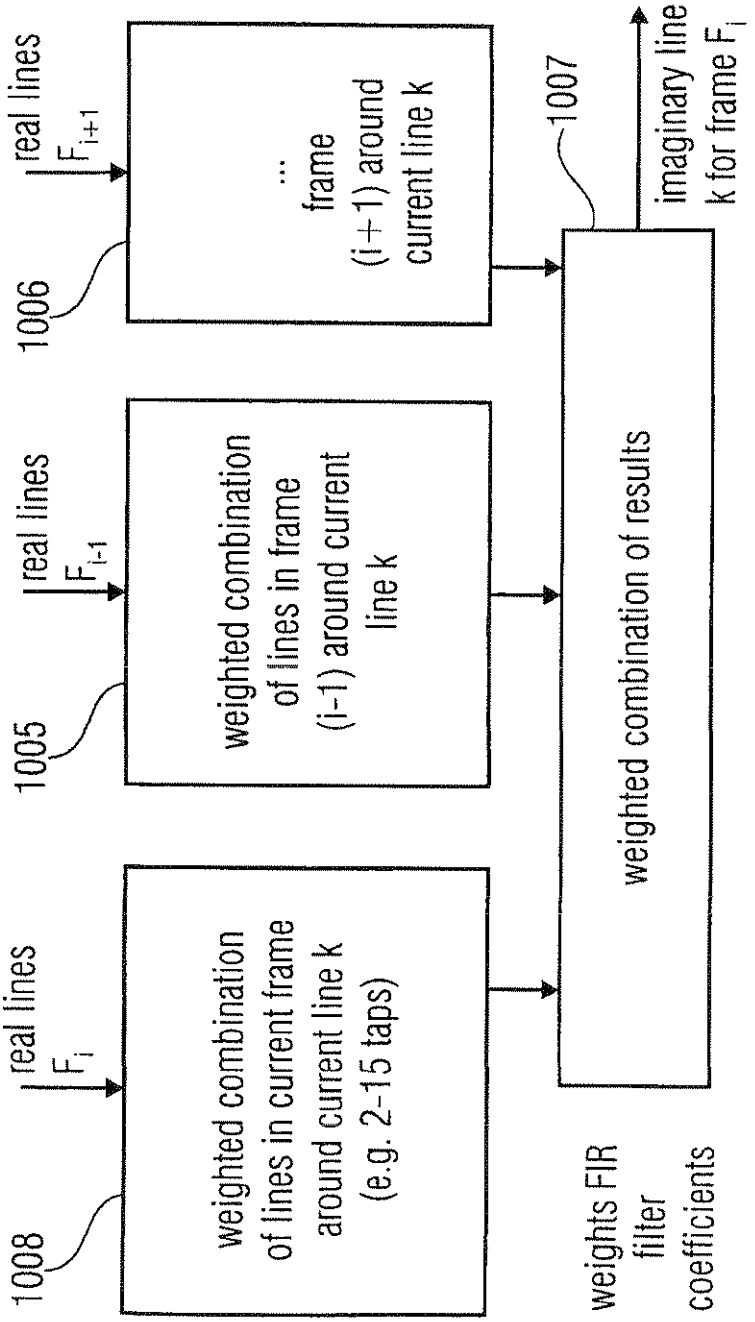

real lines F_{i+1}
1006
... frame (i+1) around current line k
real lines F_{i-1}
1005
weighted combination of lines in frame (i-1) around current line k
real lines F_i
1008
weighted combination of lines in current frame around current line k (e.g. 2-15 taps)
1007
weighted combination of results
imaginary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

FIG 10B

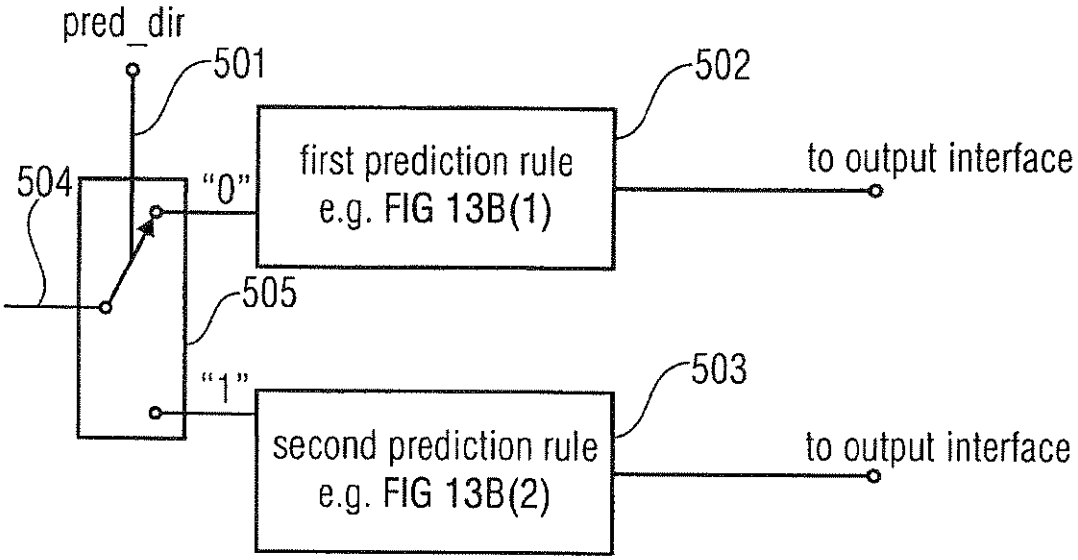


FIG 11A
(ENCODER SIDE)

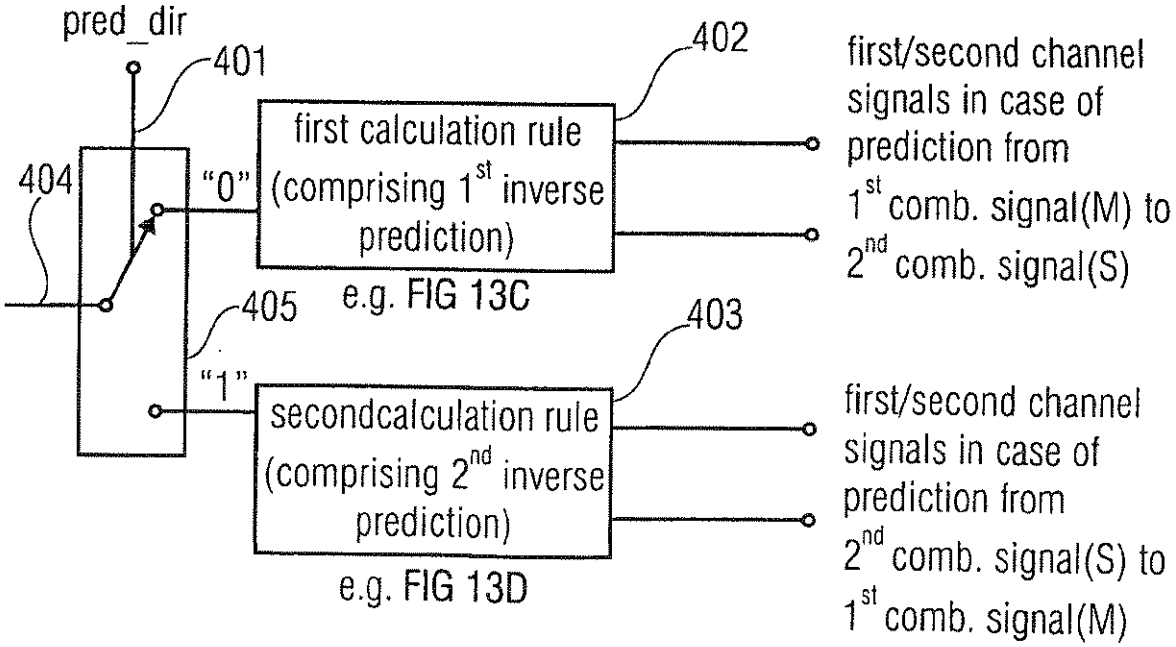


FIG 11B
(DECODER SIDE)

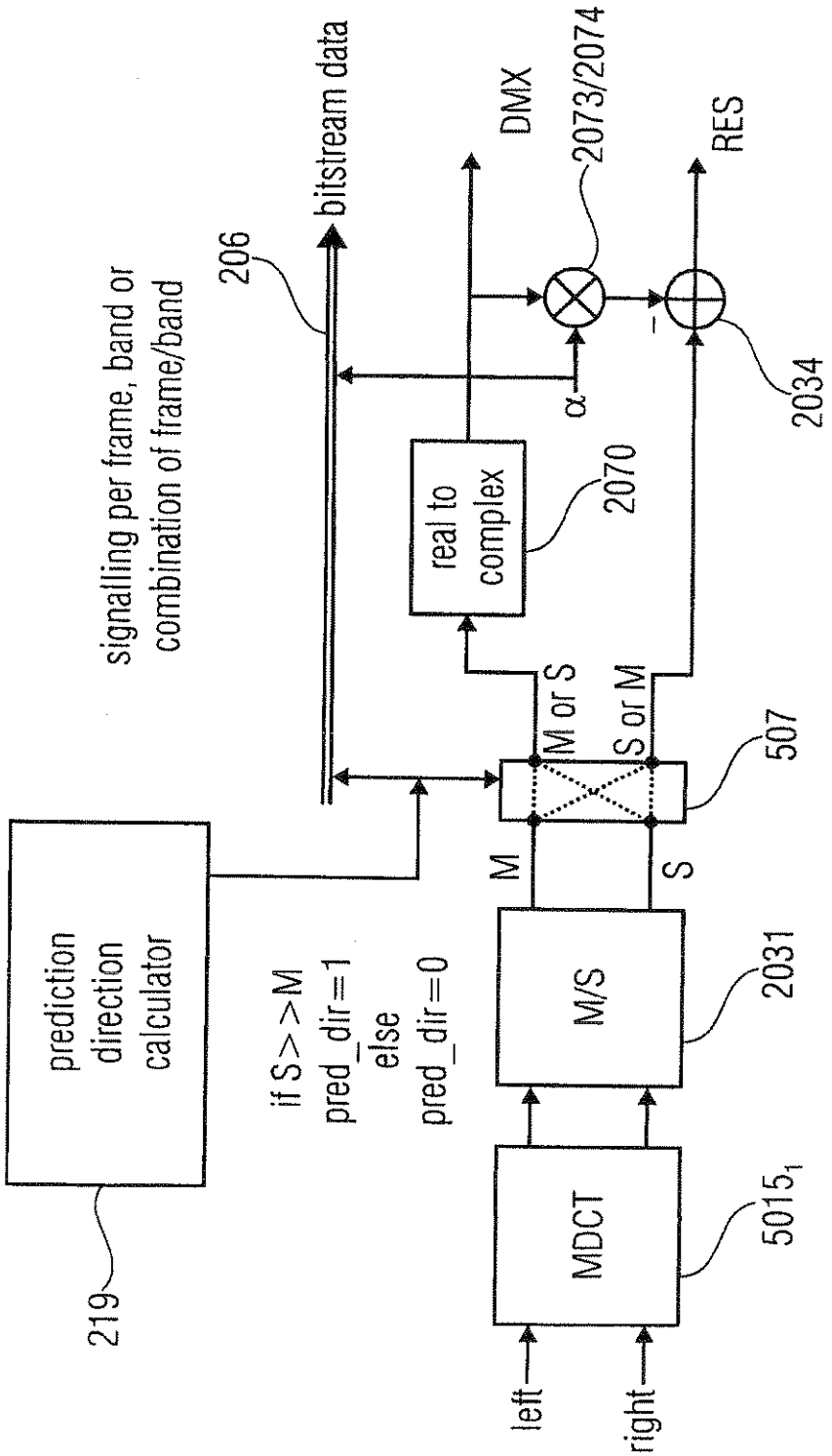


FIG 12A
(ENCODER SIDE)

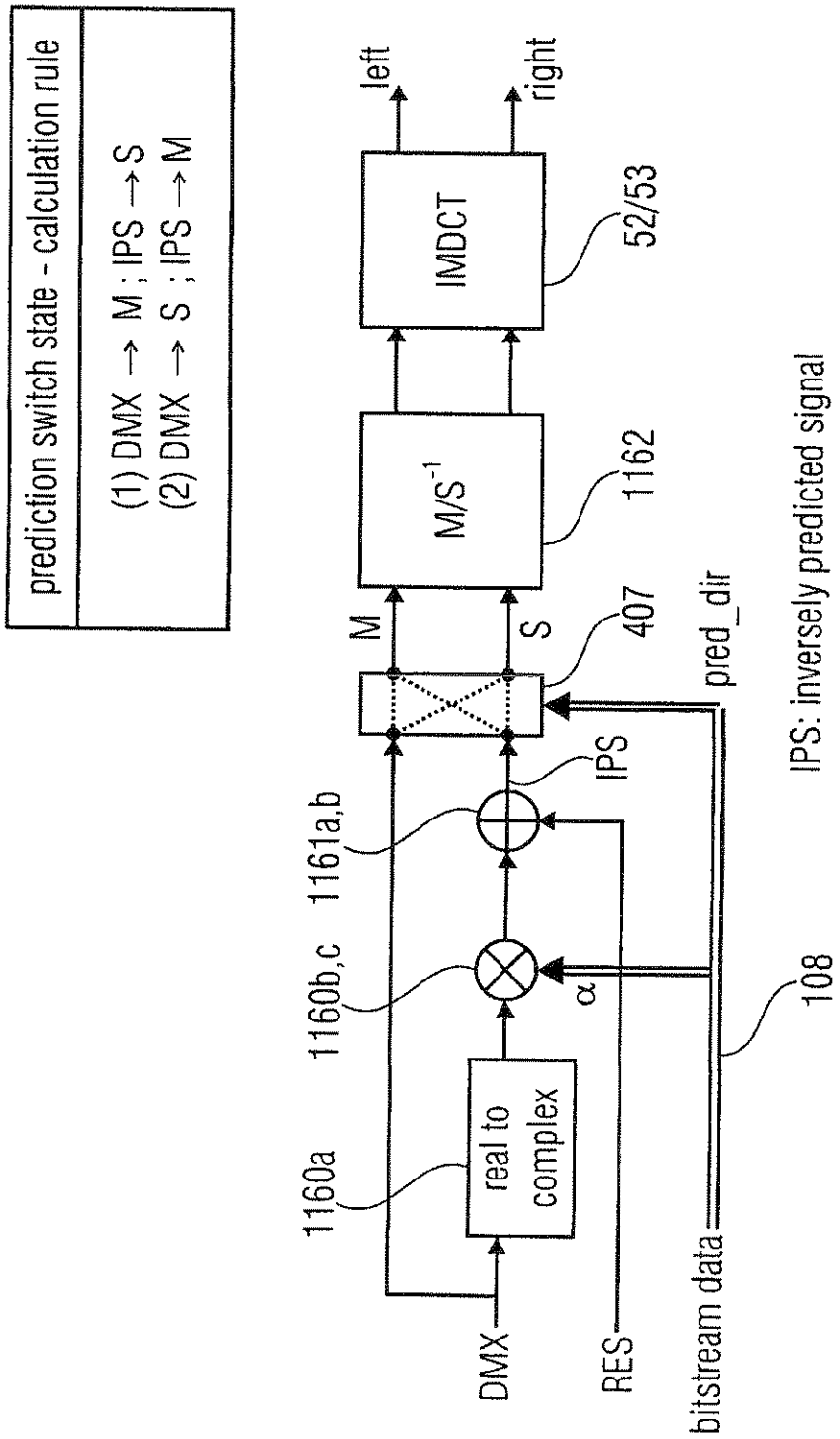


FIG 12B
(DECODER SIDE)

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

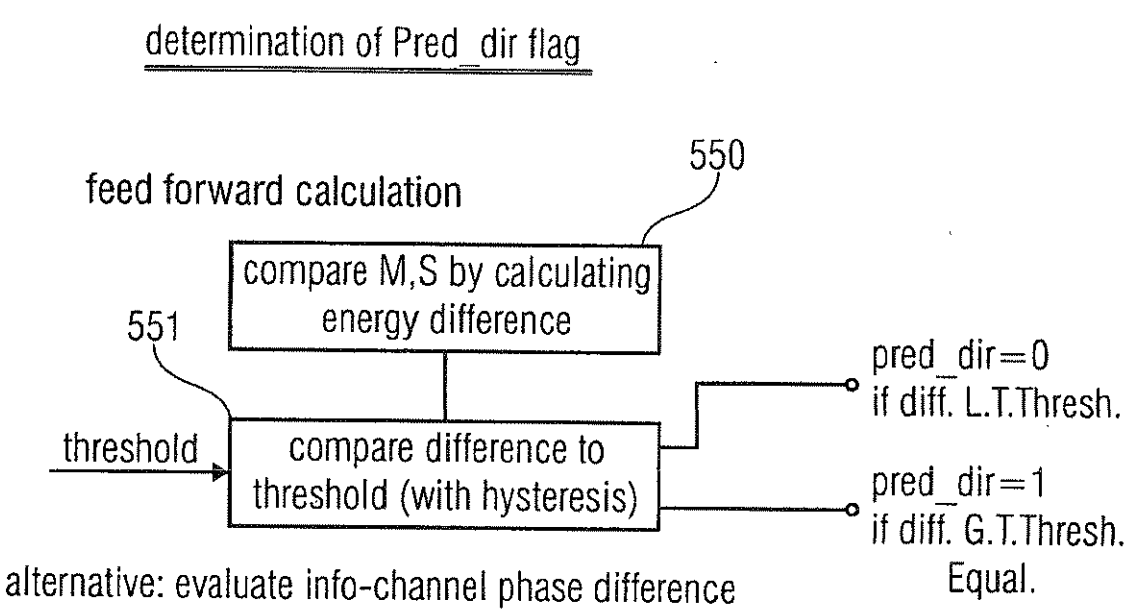


FIG 14A

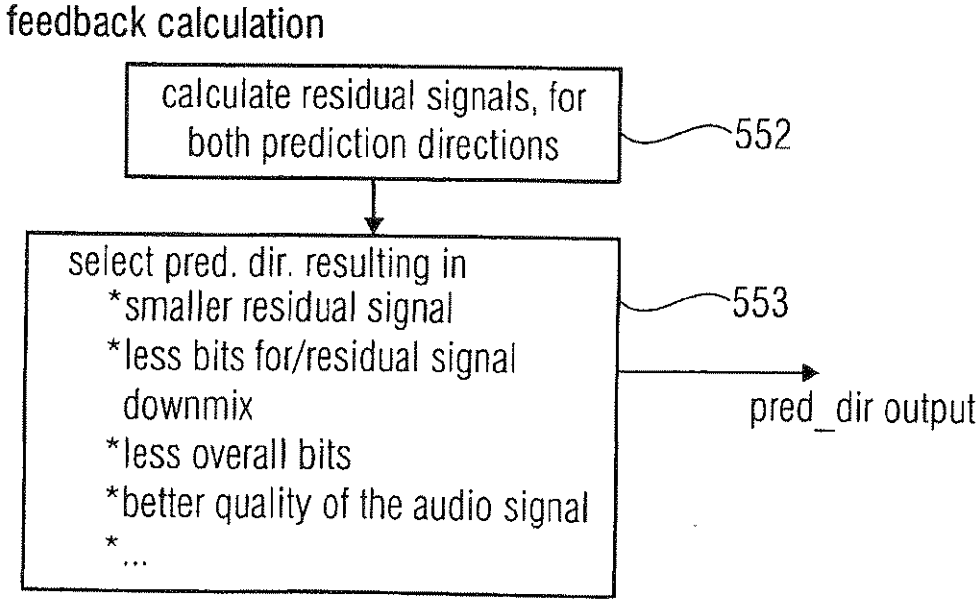


FIG 14B