

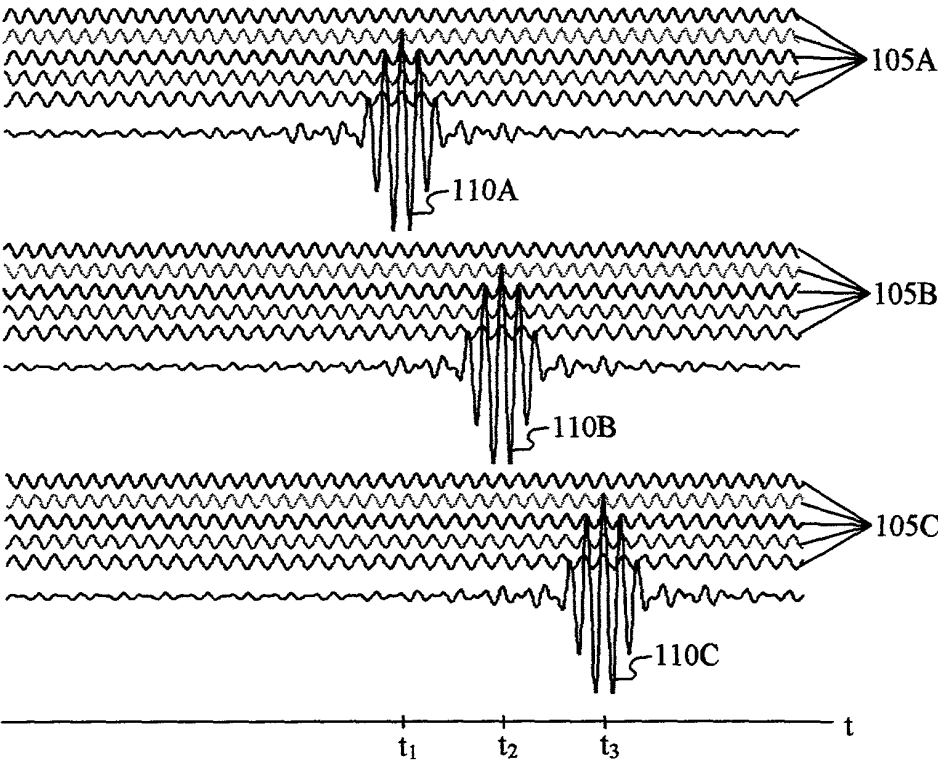


FIG. 1A

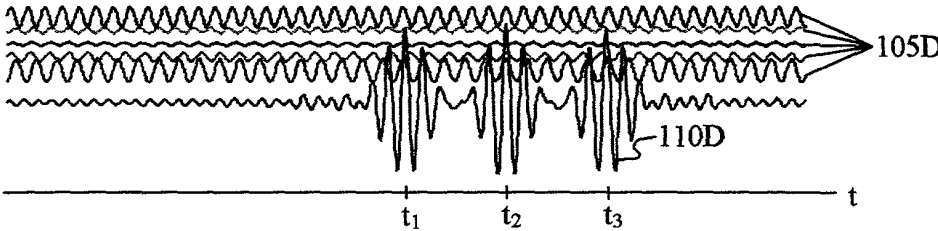


FIG. 1B

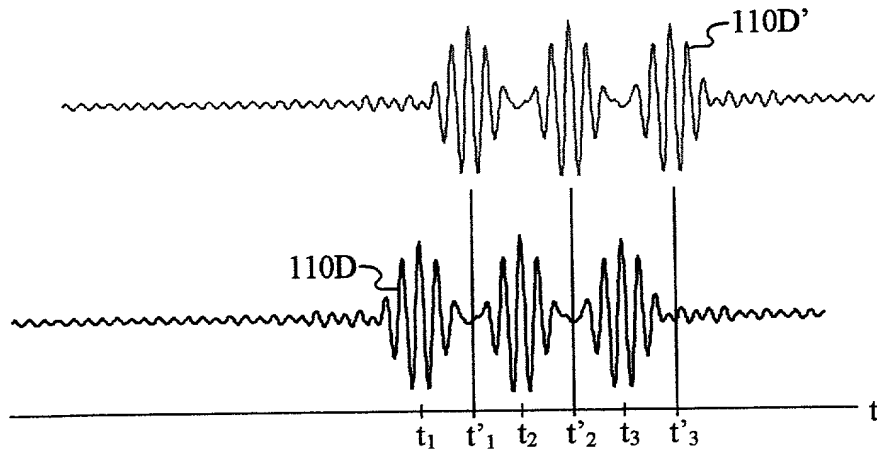


FIG. 1C

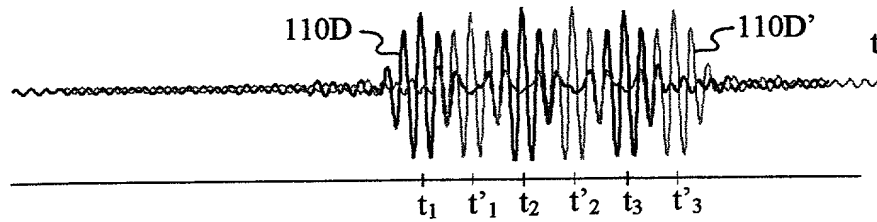


FIG. 1D

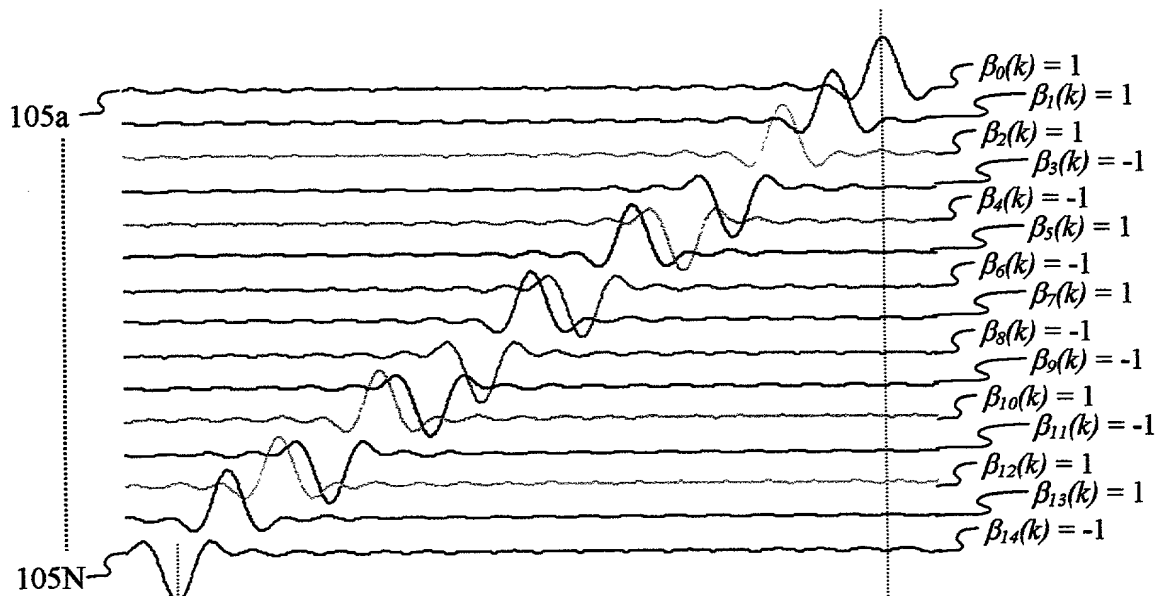


FIG. 2A

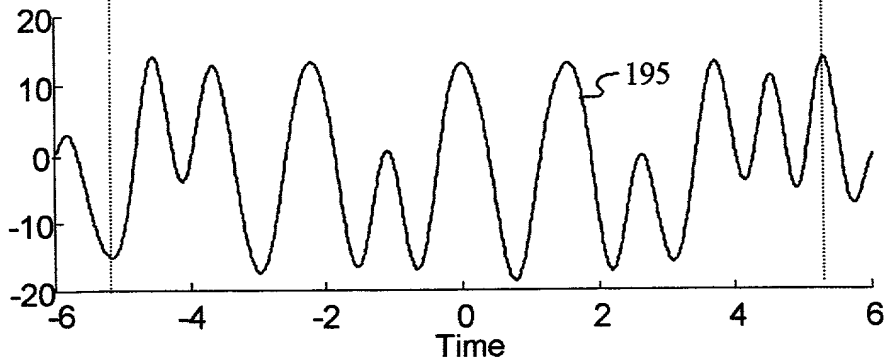
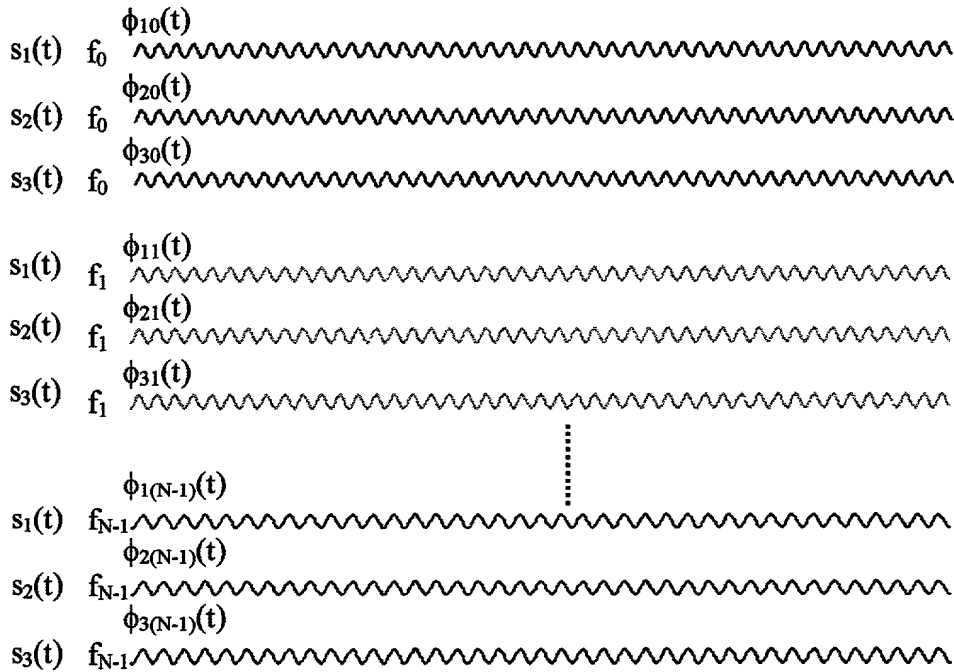
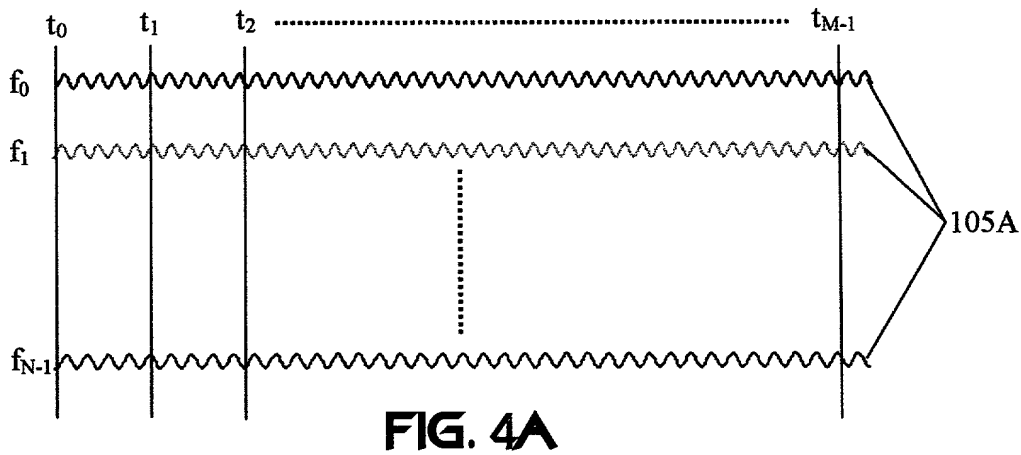
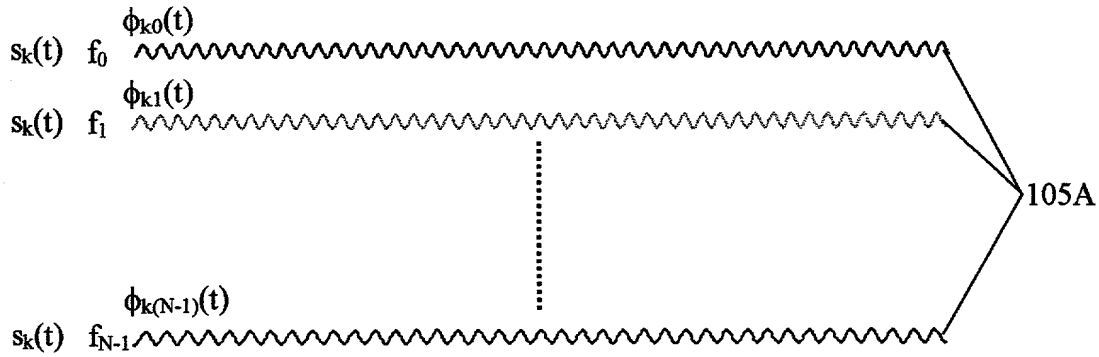
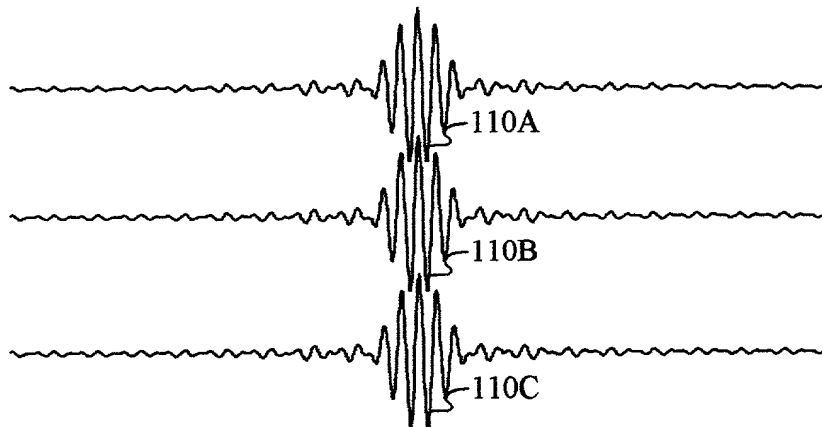
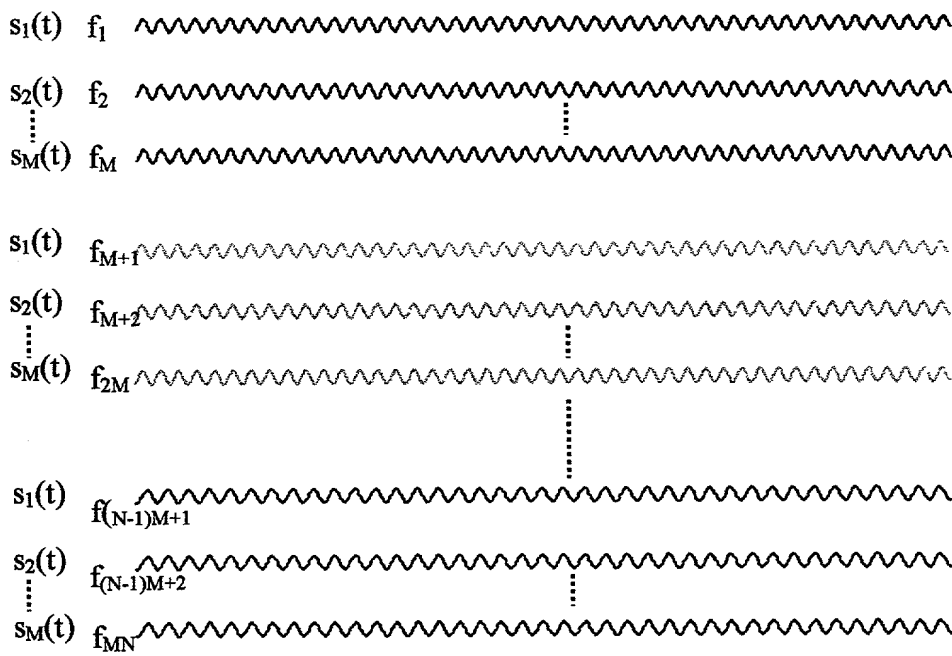
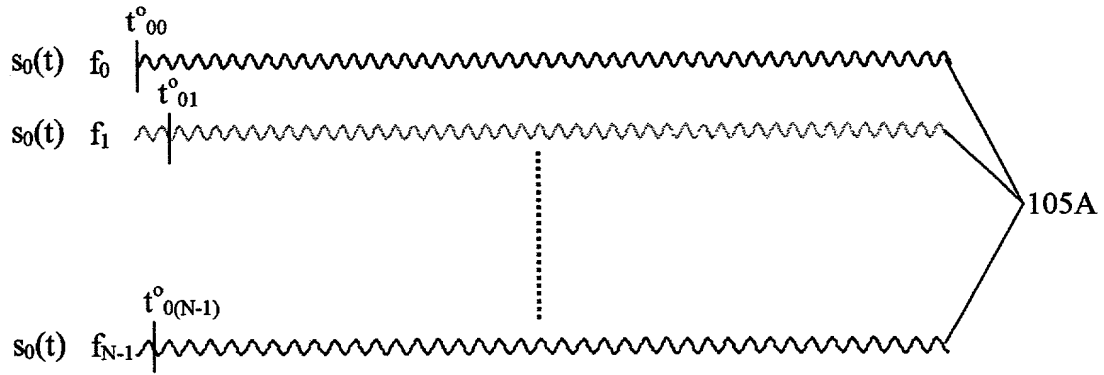


FIG. 2B





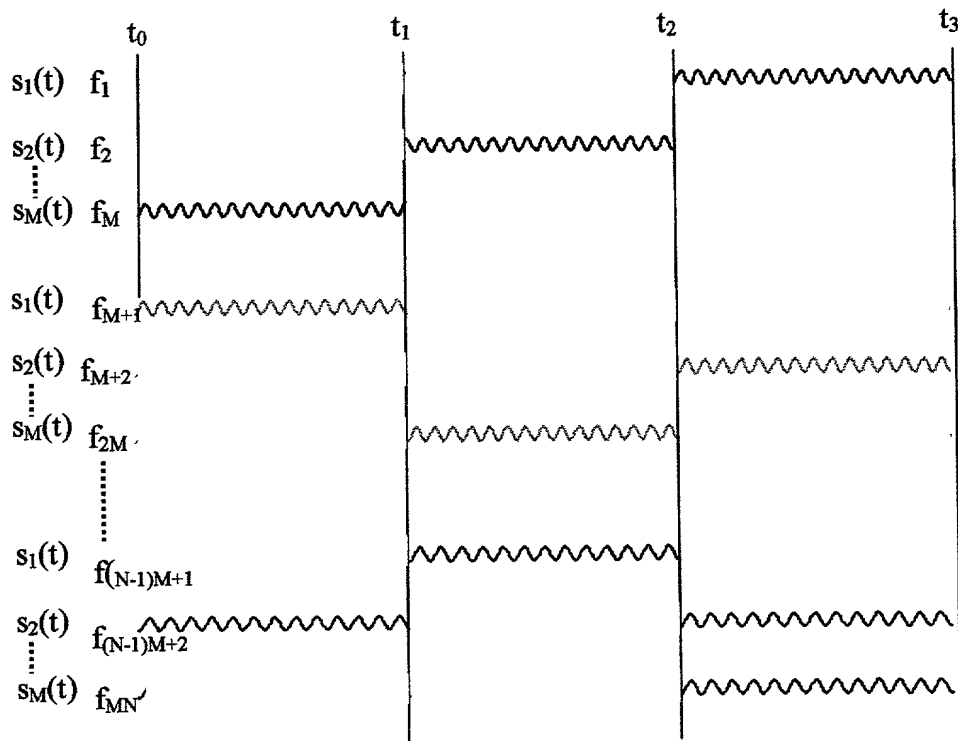


FIG. 7

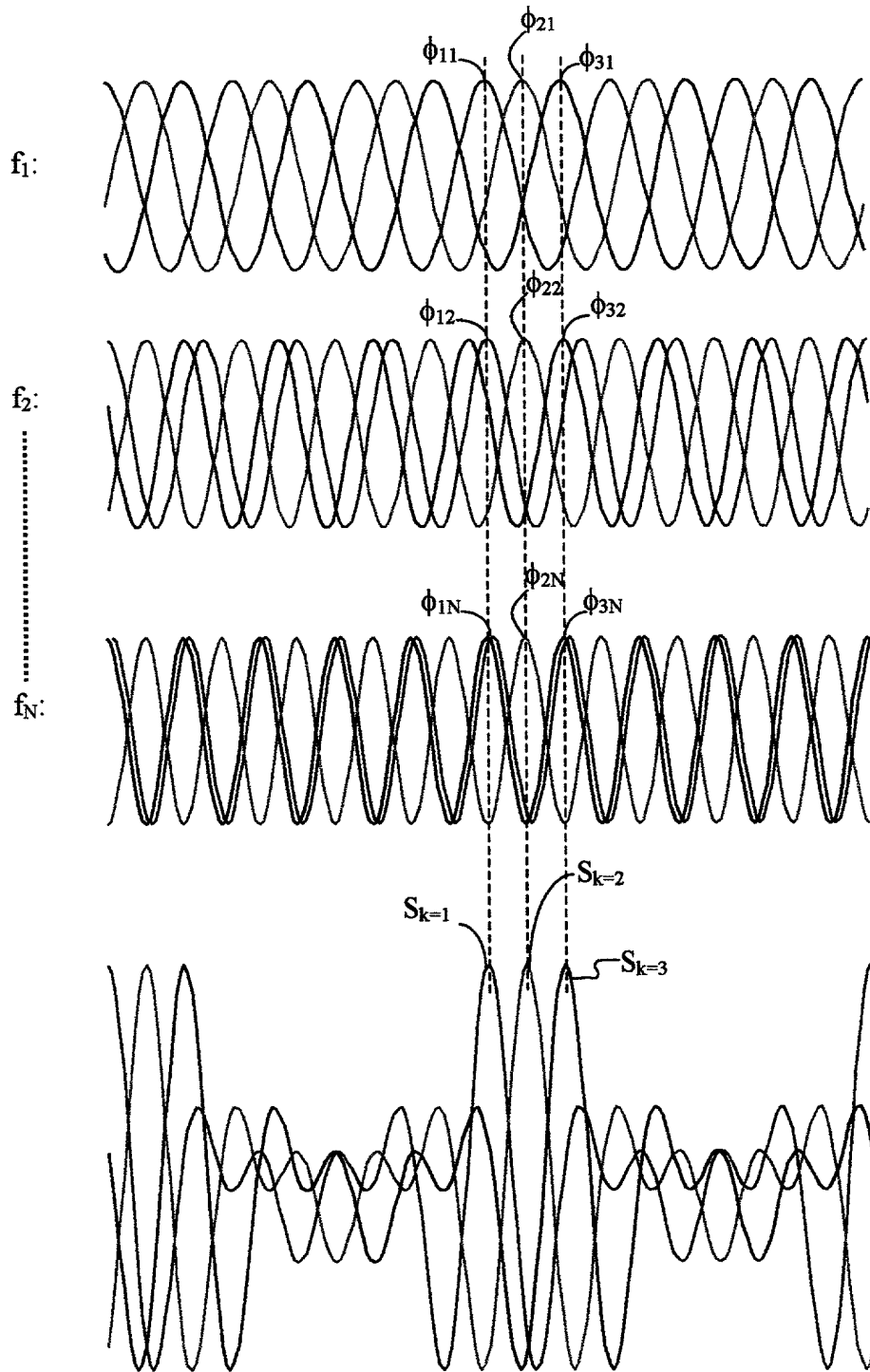


FIG. 8

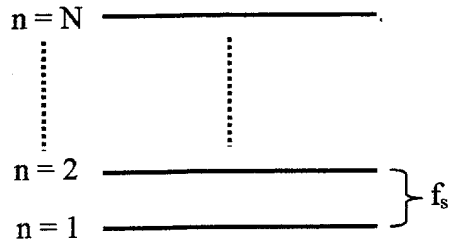


FIG. 9A

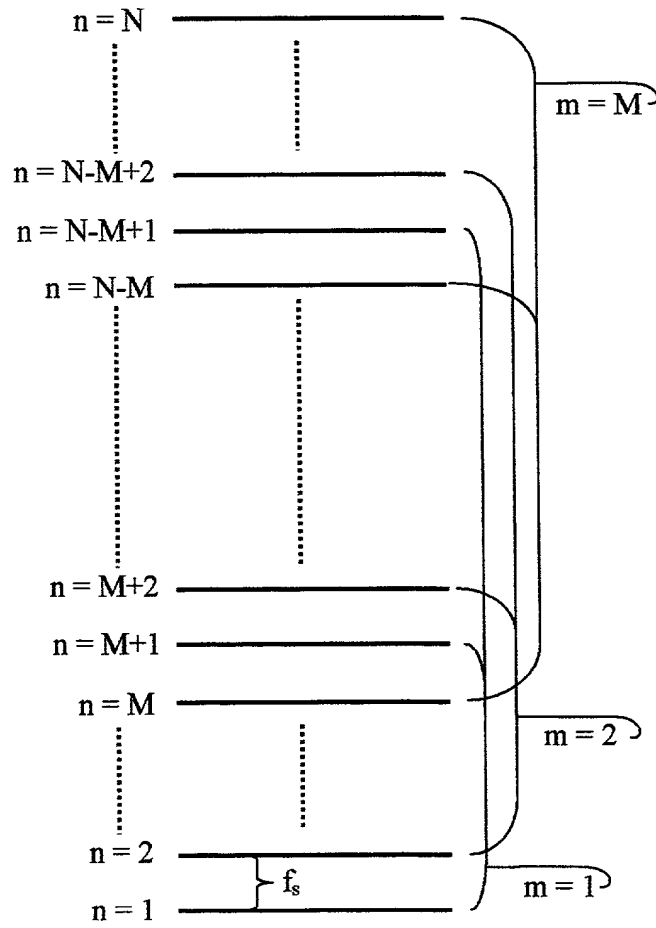


FIG. 9B



FIG. 10A

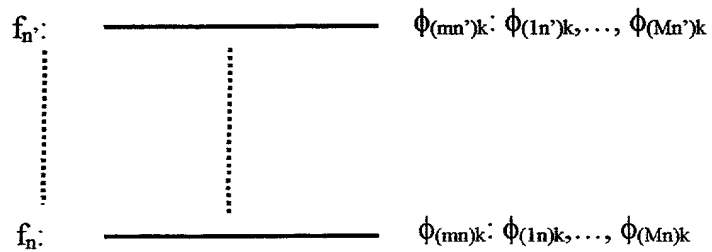


FIG. 10B

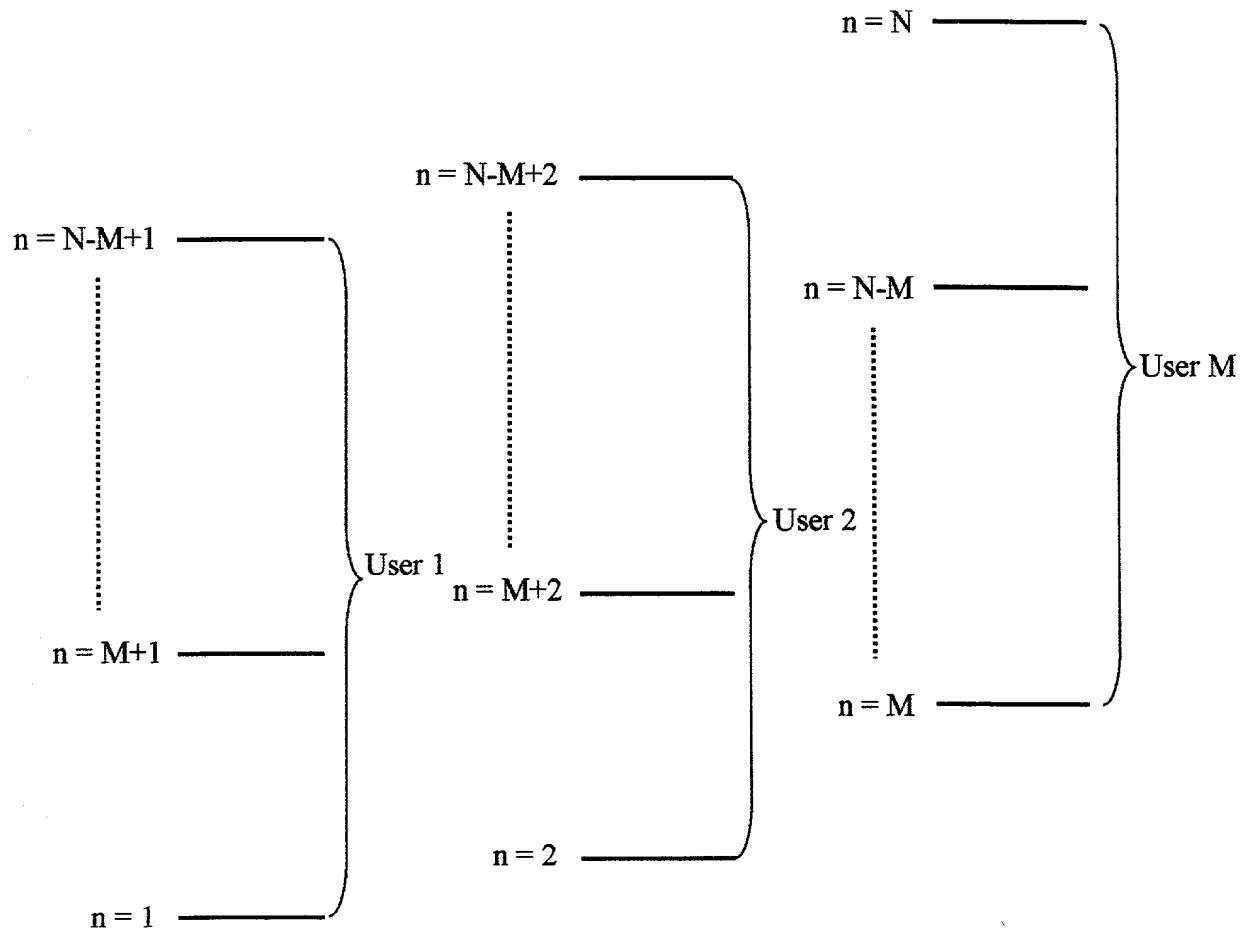


FIG. 11

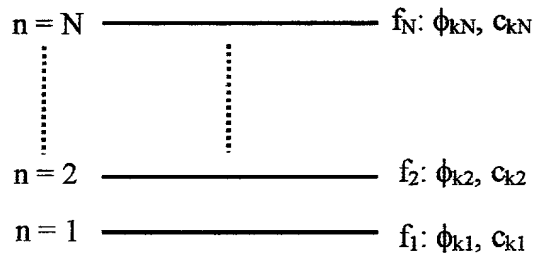


FIG. 12

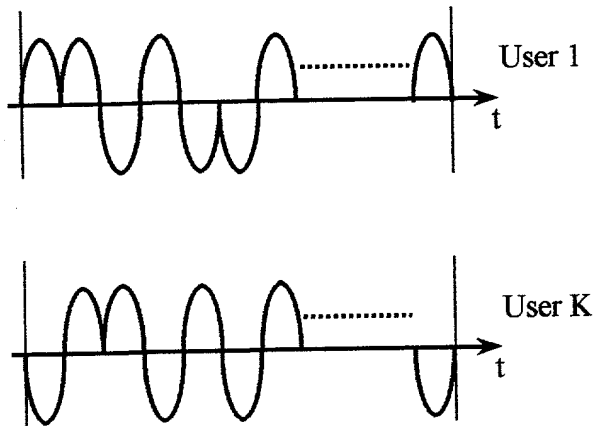


FIG. 13A

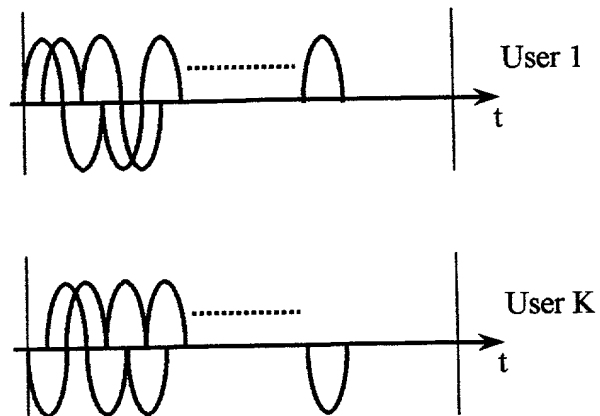


FIG. 13B

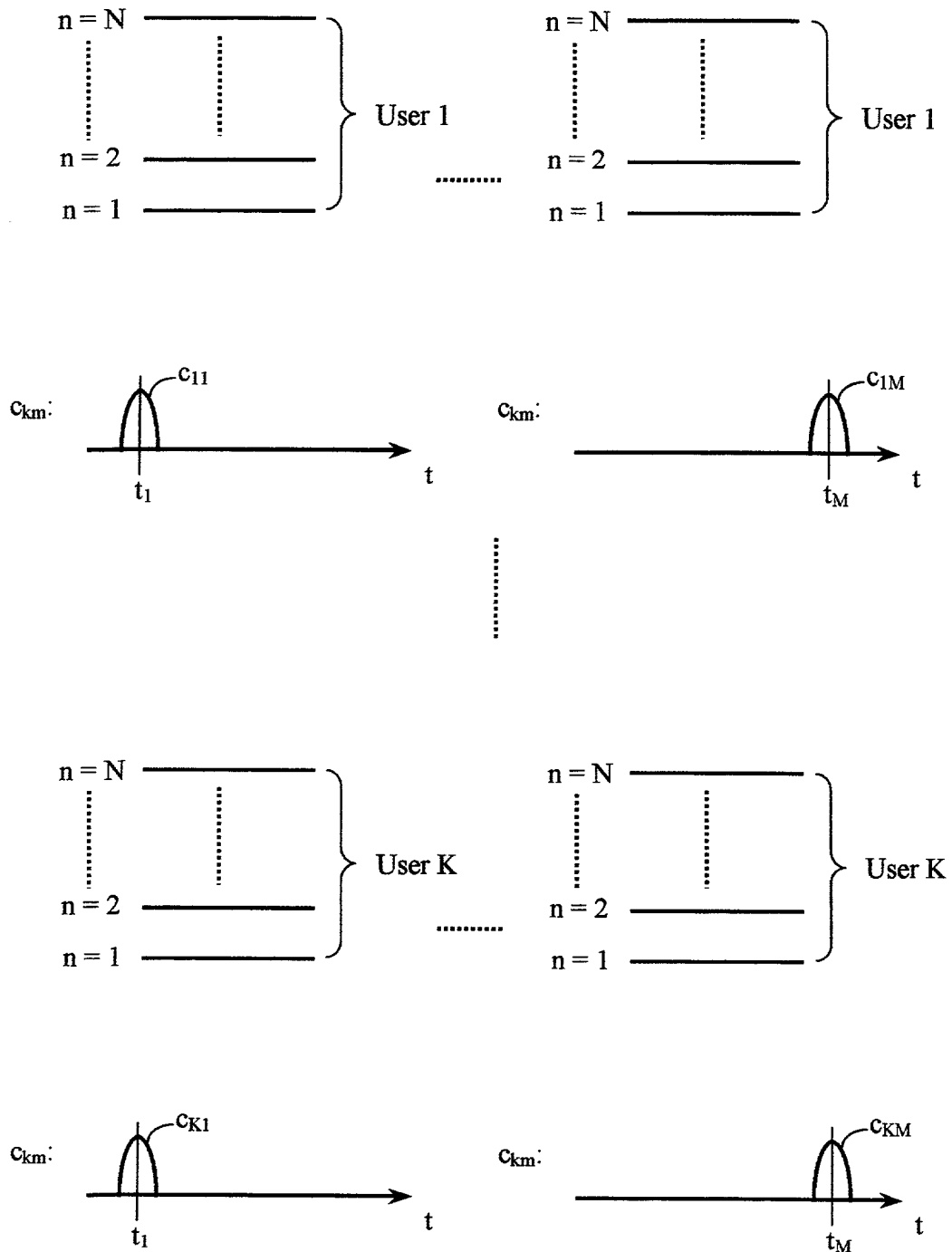


FIG. 13C

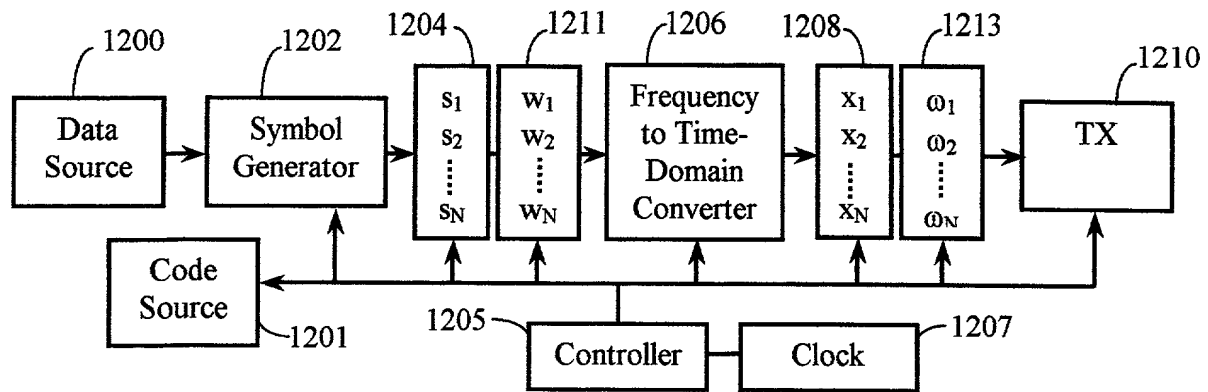


FIG. 14A

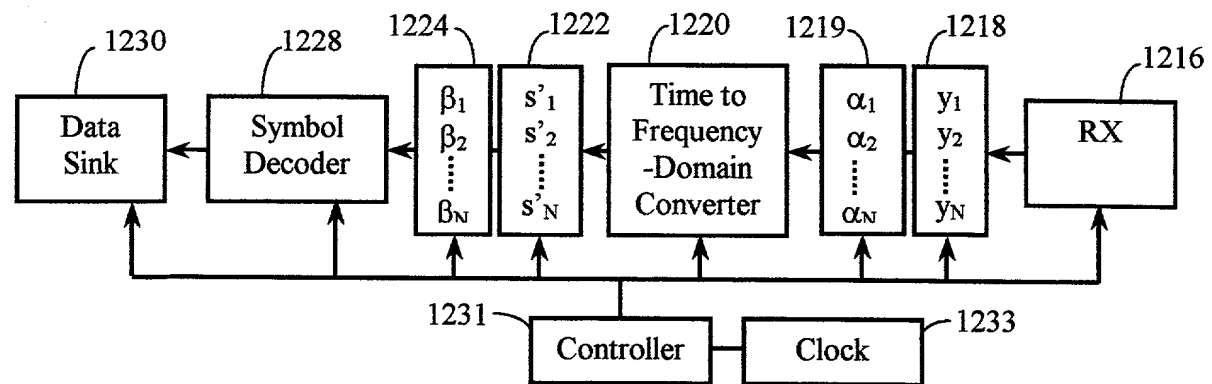


FIG. 14B

	$Ps(0)$	$Ps(1)$	$Ps(2)$	.....	$Ps(N-1)$
f_0 :	ϕ_0	ϕ_0	ϕ_0		ϕ_0
f_1 :	ϕ_1	$\phi_1 + 2\pi T_{ps} f_1$	$\phi_1 + 2\pi 2 T_{ps} f_1$	.....	$\phi_1 + 2\pi(N-1) T_{ps} f_1$
f_2 :	ϕ_2	$\phi_2 + 2\pi T_{ps} f_2$	$\phi_2 + 2\pi 2 T_{ps} f_2$	.....	$\phi_2 + 2\pi(N-1) T_{ps} f_2$
$\vdots$	$\vdots$	$\vdots$	$\vdots$		$\vdots$
f_{N-1} :	ϕ_{N-1}	$\phi_{N-1} + 2\pi T_{ps} f_{N-1}$	$\phi_{N-1} + 2\pi 2 T_{ps} f_{N-1}$	.....	$\phi_{N-1} + 2\pi(N-1) T_{ps} f_{N-1}$

FIG. 15A

	$Ps(0)$	$Ps(1)$	$Ps(2)$	.....	$Ps(N-1)$
f_0 :	s_0	s_1	s_2		s_{N-1}
f_1 :	s_0	$s_1 e^{i2\pi T_{ps} f_s}$	$s_2 e^{i2\pi 2 T_{ps} f_s}$	.....	$s_{N-1} e^{i2\pi(N-1) T_{ps} f_s}$
f_2 :	s_0	$s_1 e^{i2\pi T_{ps} 2 f_s}$	$s_2 e^{i2\pi 2 T_{ps} 2 f_s}$	.....	$s_{N-1} e^{i2\pi(N-1) T_{ps} 2 f_s}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$		$\vdots$
f_{N-1} :	s_0	$s_1 e^{i2\pi T_{ps} (N-1) f_s}$	$s_2 e^{i2\pi 2 T_{ps} (N-1) f_s}$	.....	$s_{N-1} e^{i2\pi(N-1) T_{ps} (N-1) f_s}$

FIG. 15B

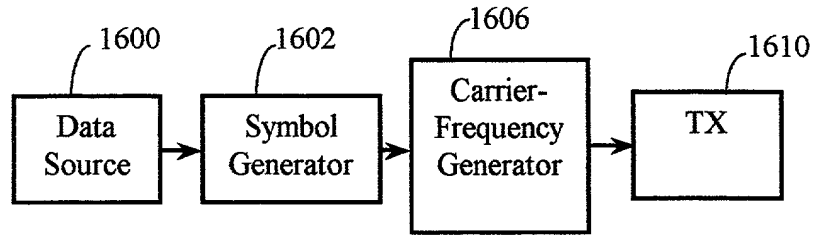


FIG. 16A

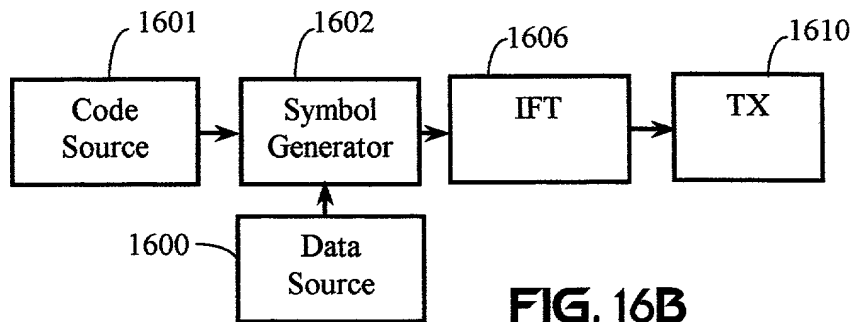


FIG. 16B

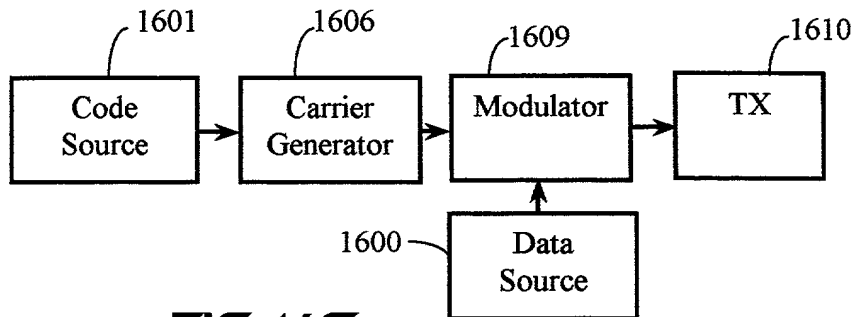


FIG. 16C

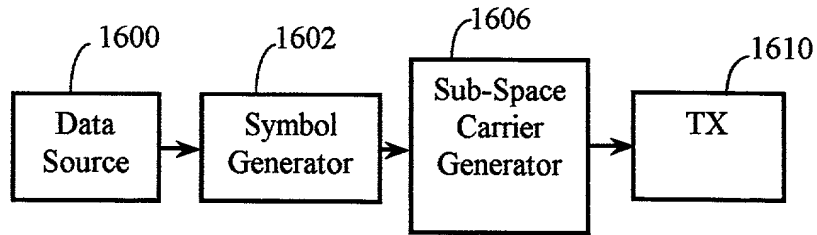


FIG. 16D

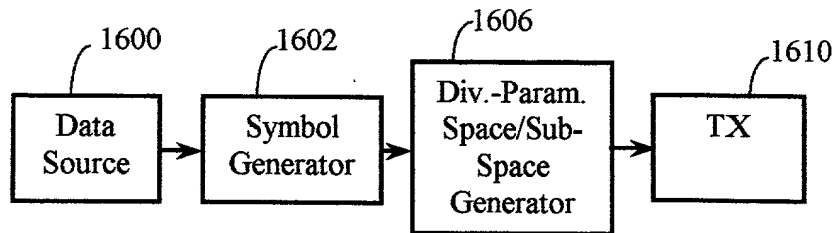


FIG. 16E

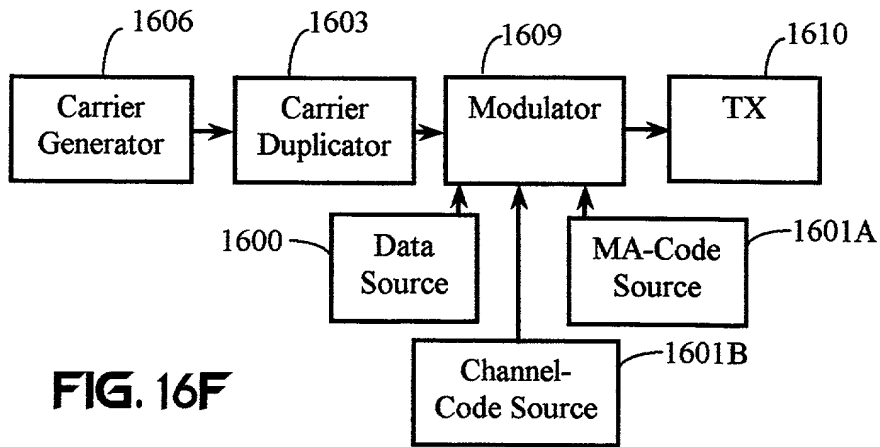


FIG. 16F

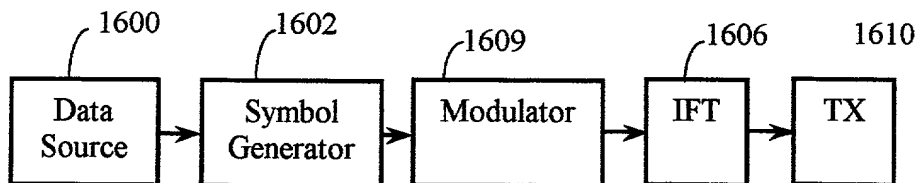


FIG. 16G

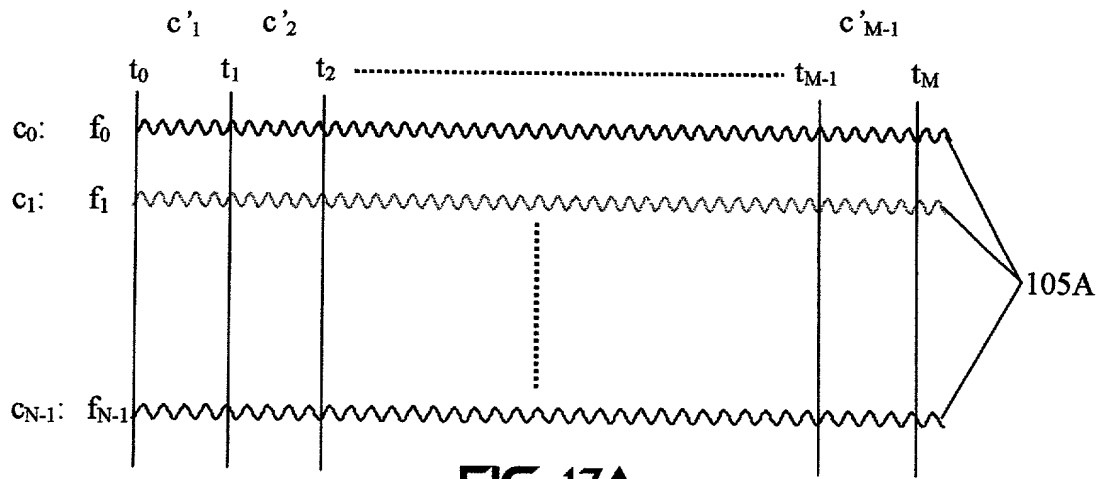


FIG. 17A

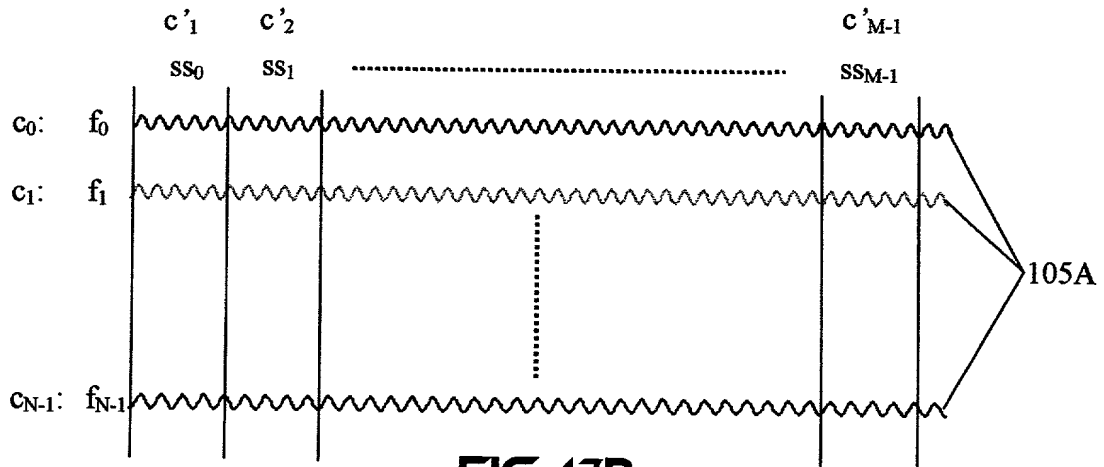


FIG. 17B

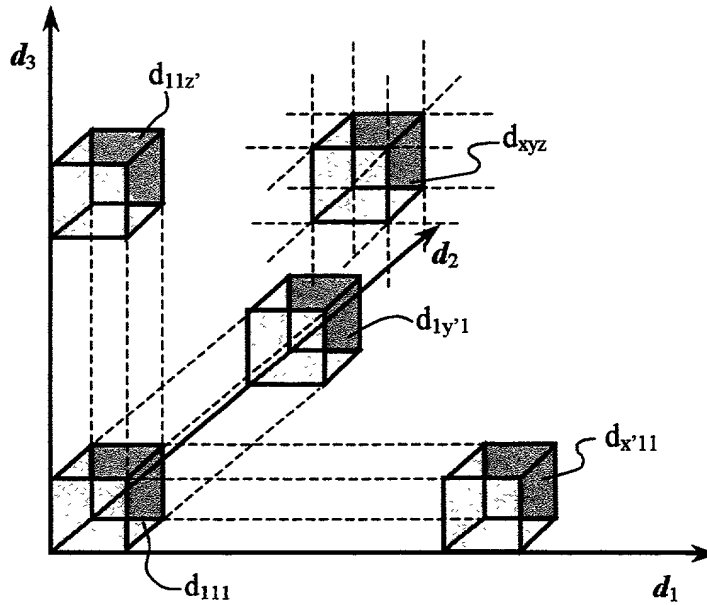


FIG. 17C

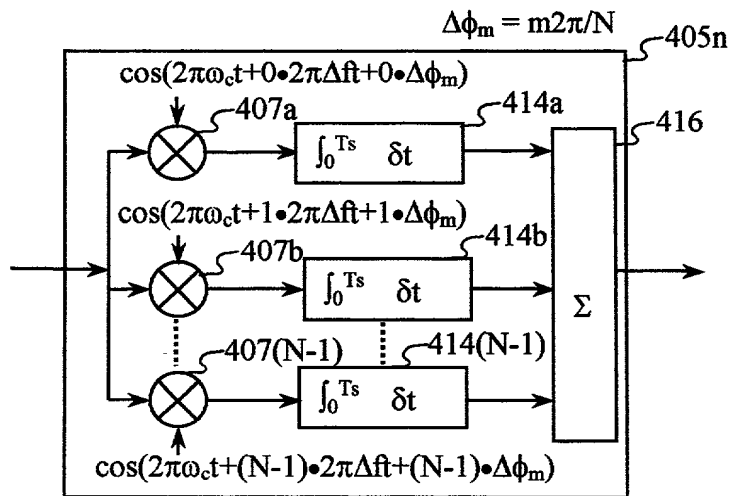


FIG. 18A

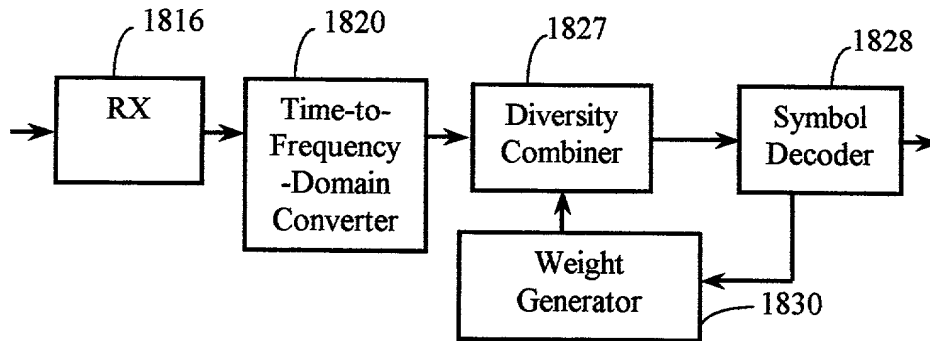


FIG. 18B

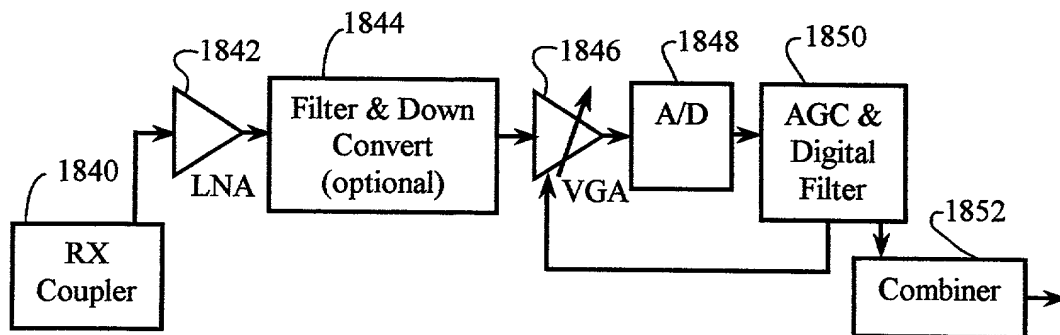


FIG. 18C

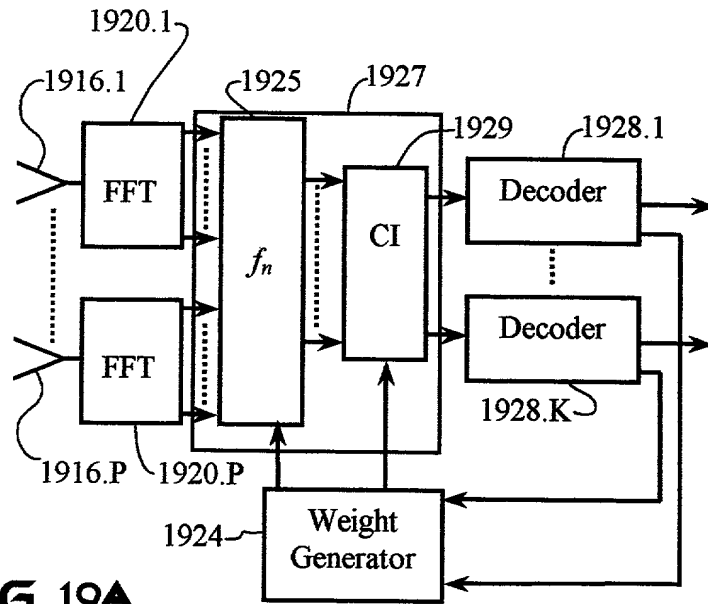


FIG. 19A

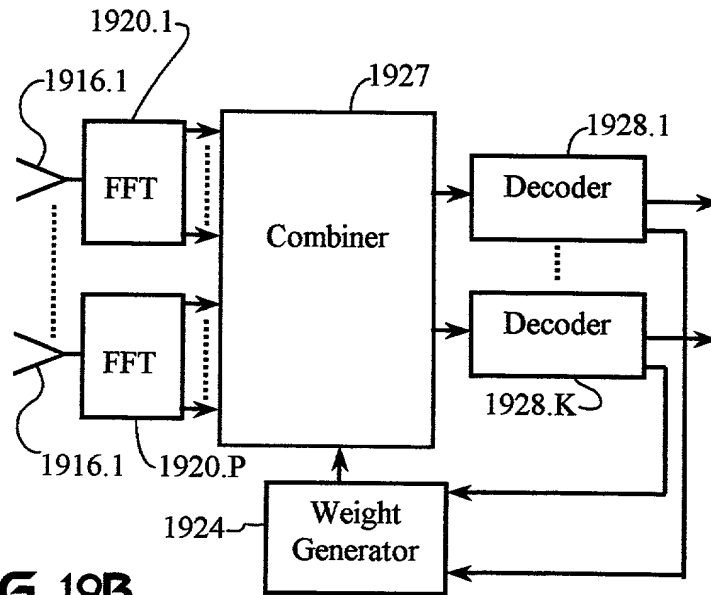


FIG. 19B

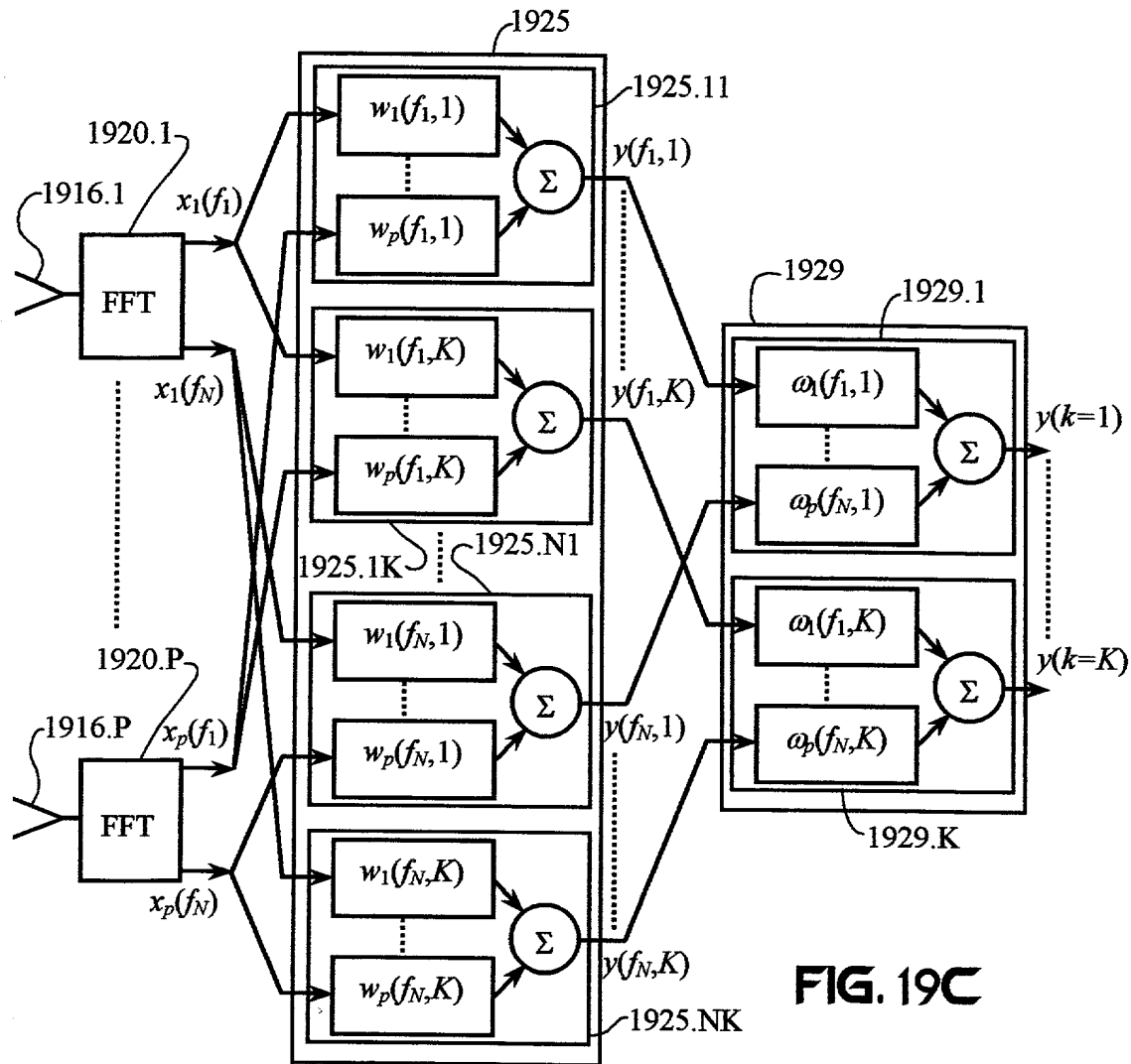


FIG. 19C

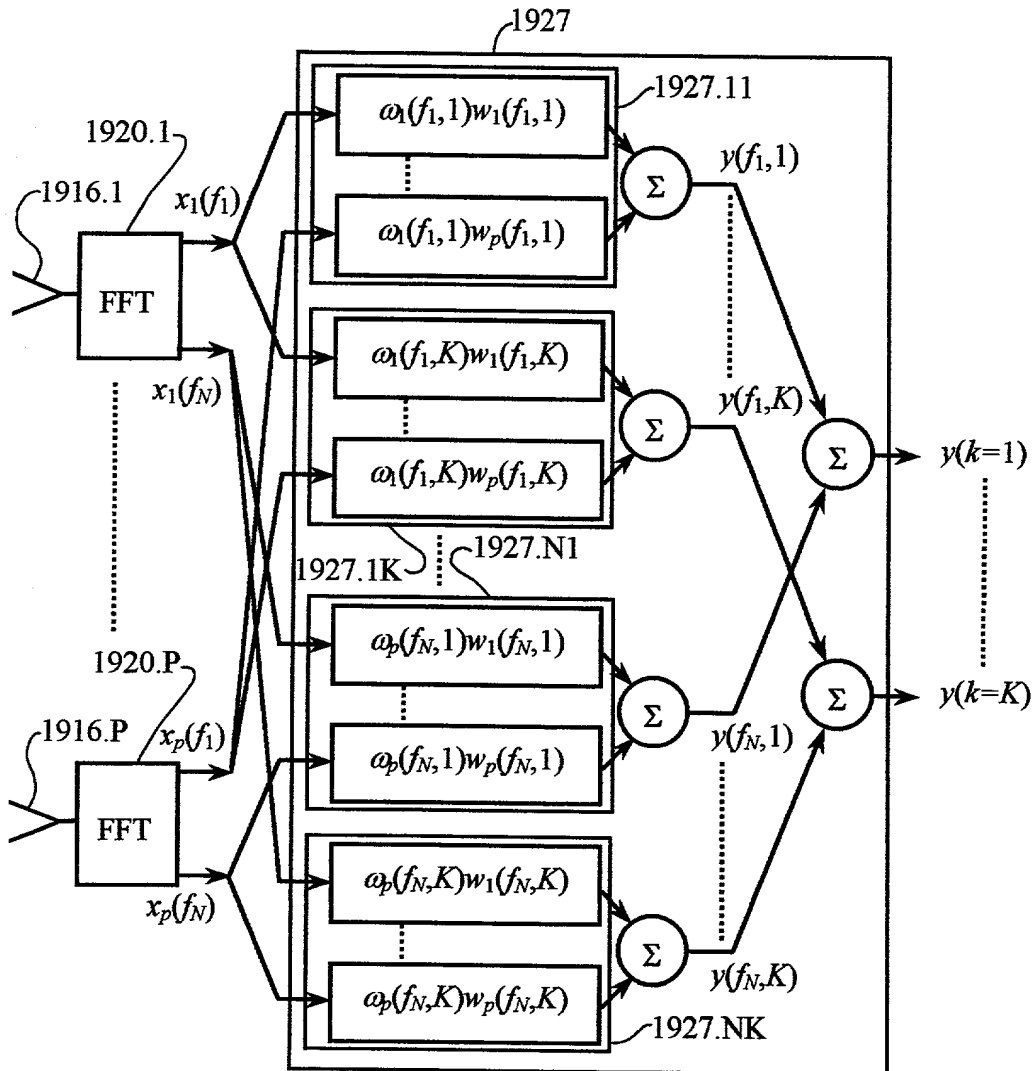


FIG. 19D

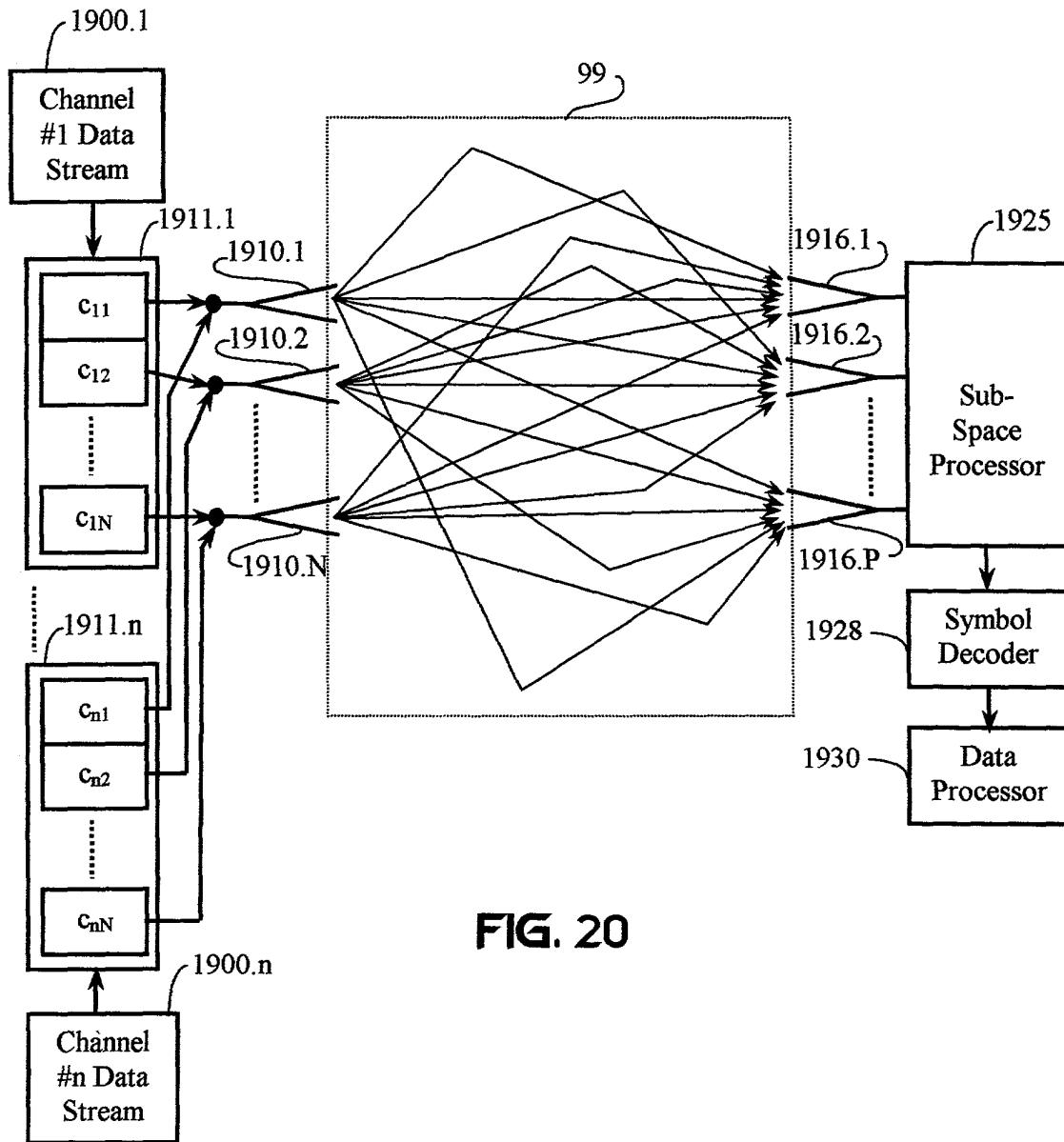


FIG. 20

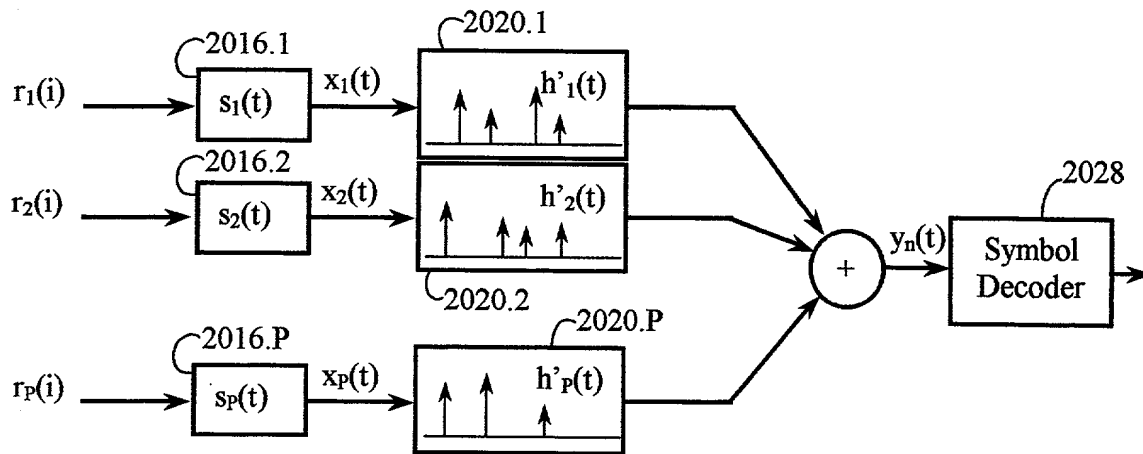


FIG. 21A

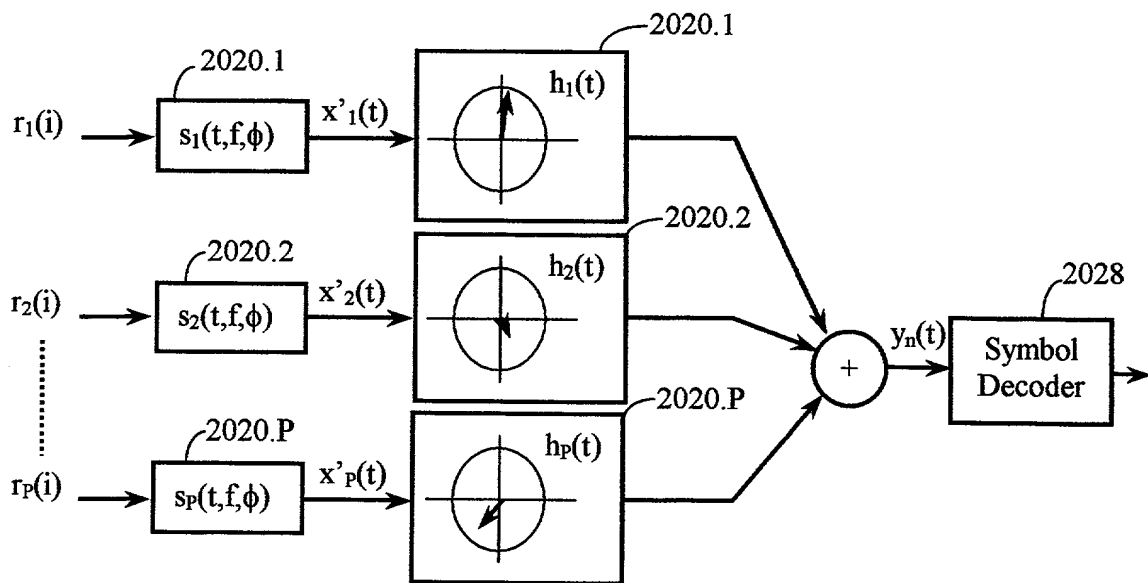


FIG. 21B

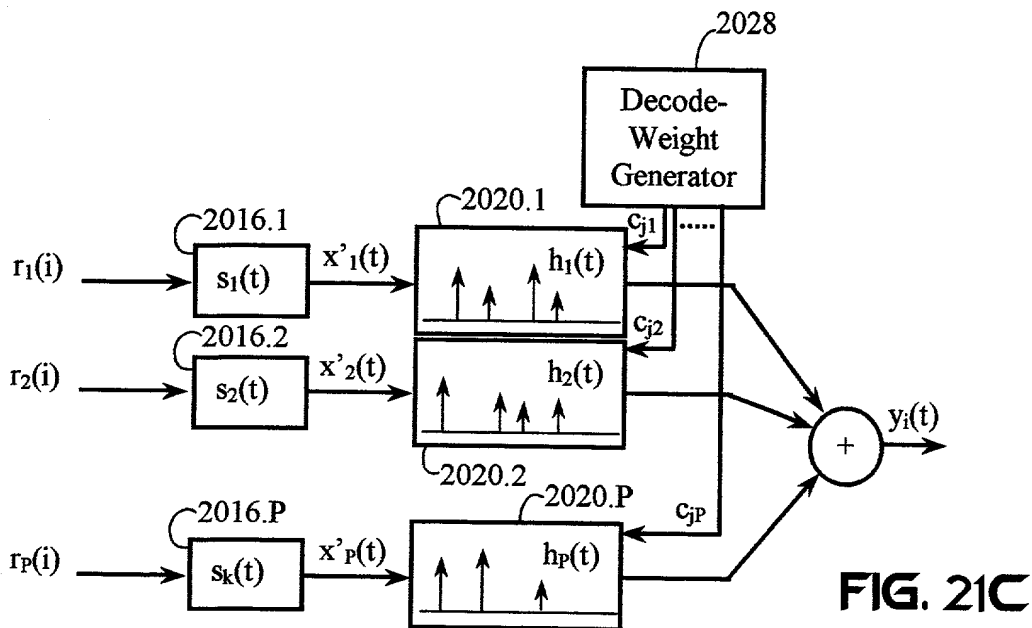


FIG. 21C

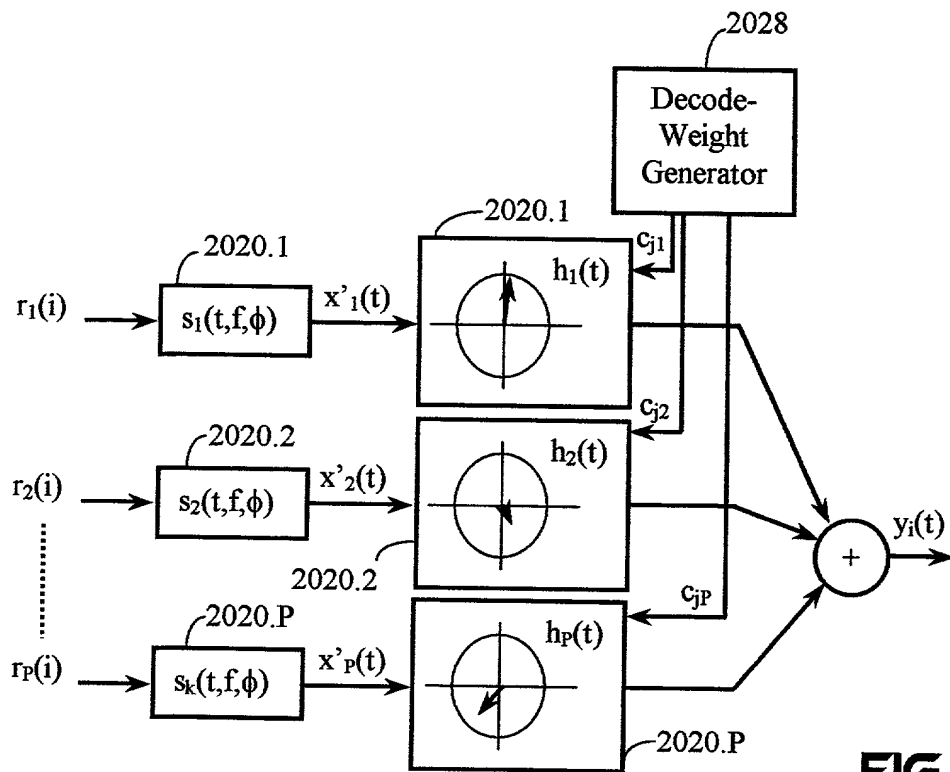


FIG. 21D

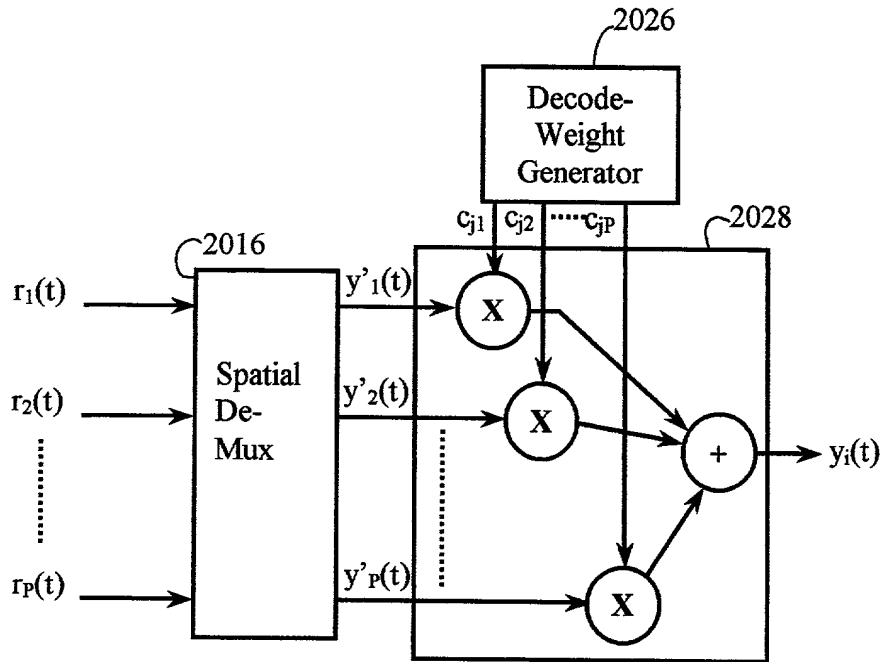


FIG. 21E

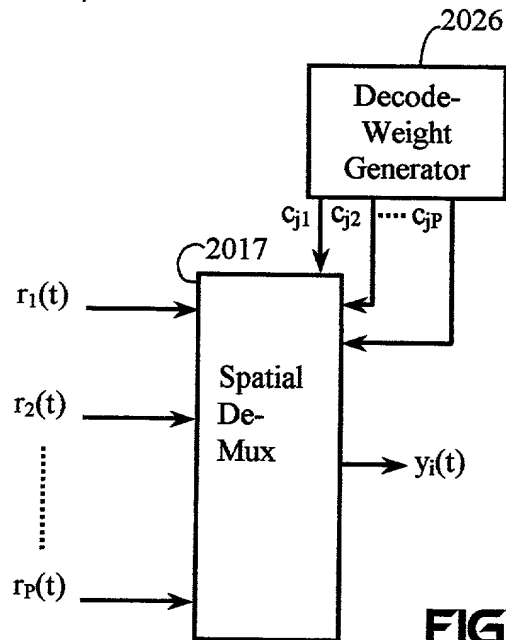


FIG. 21F

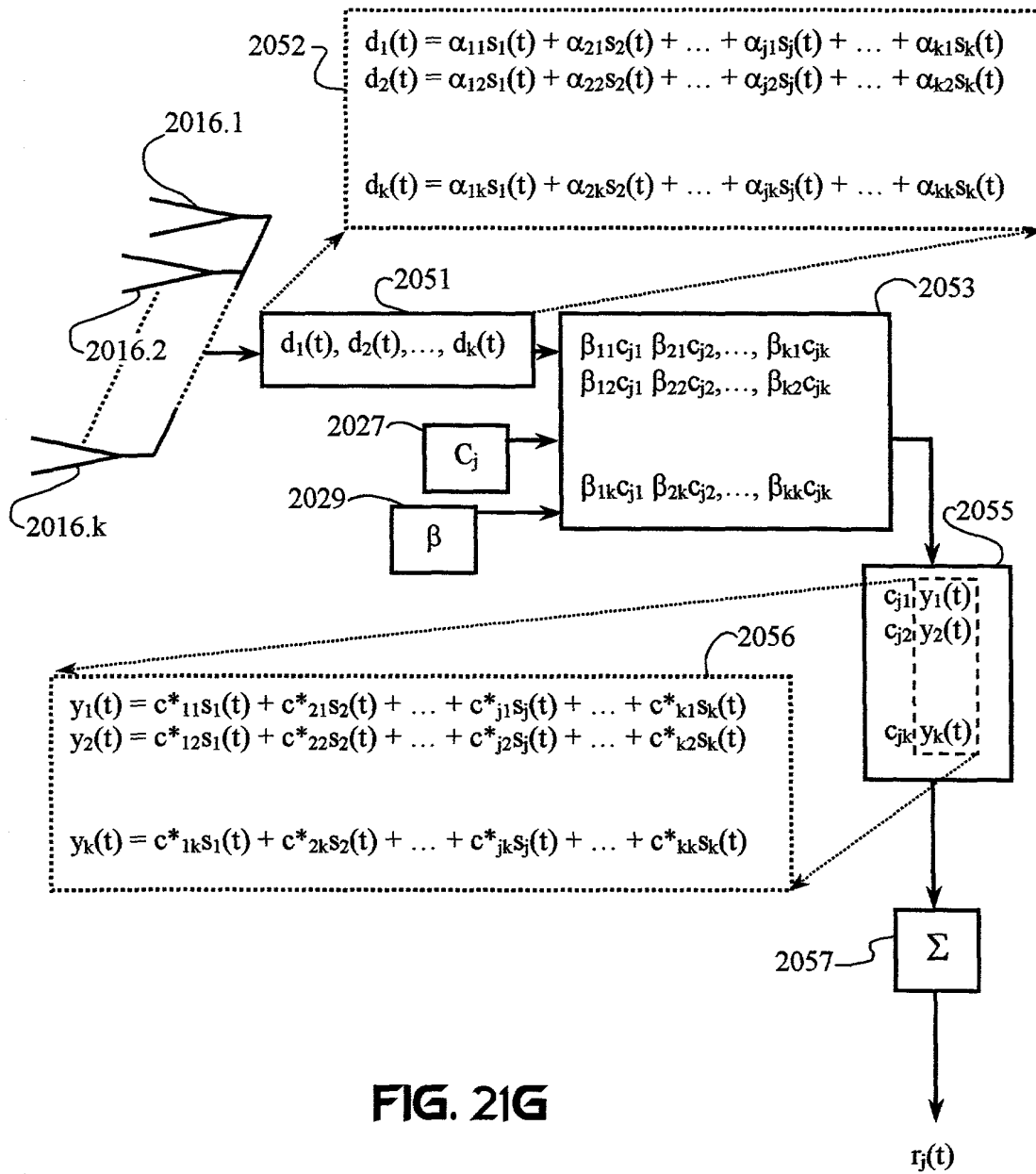


FIG. 21G

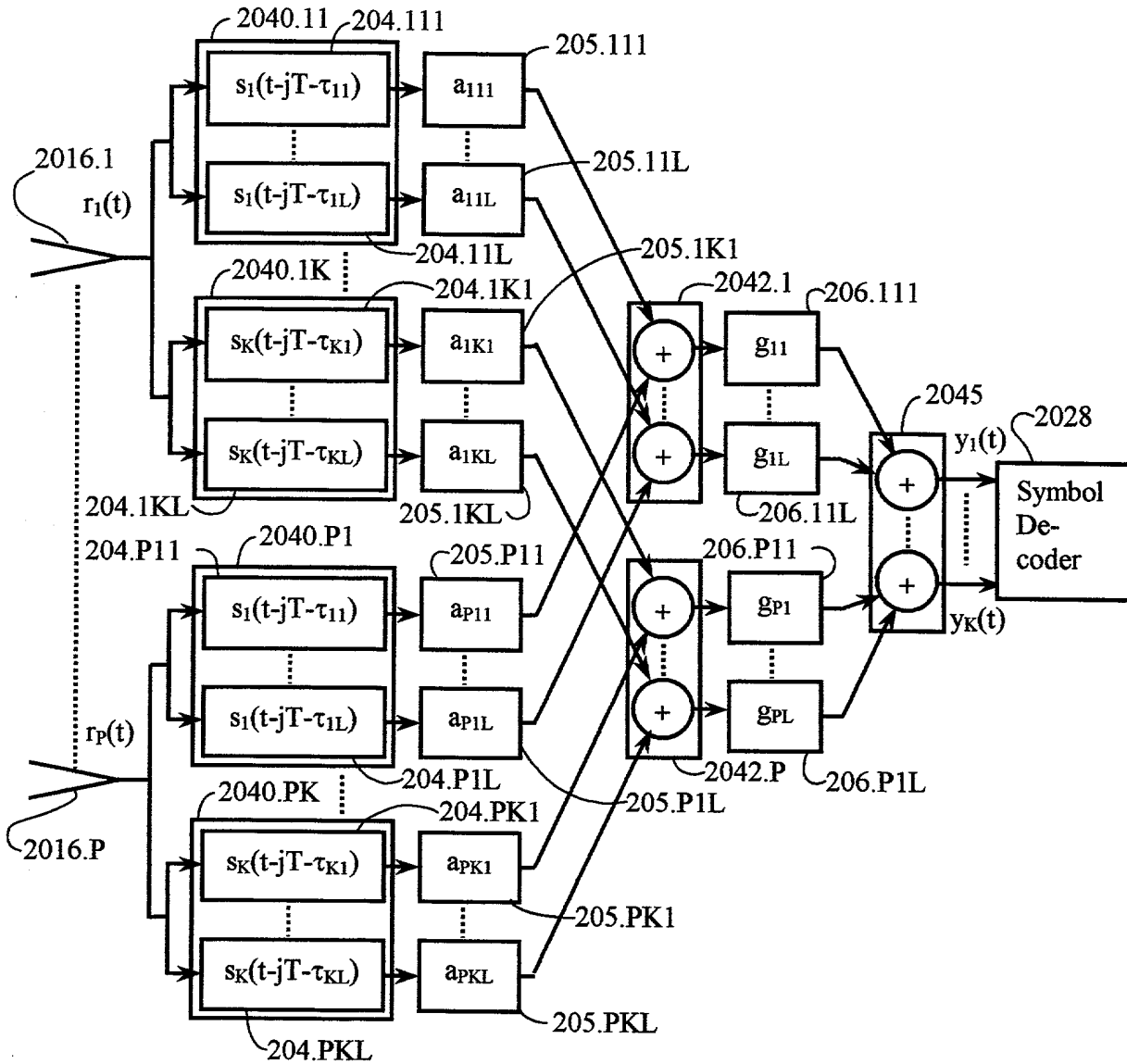


FIG. 22

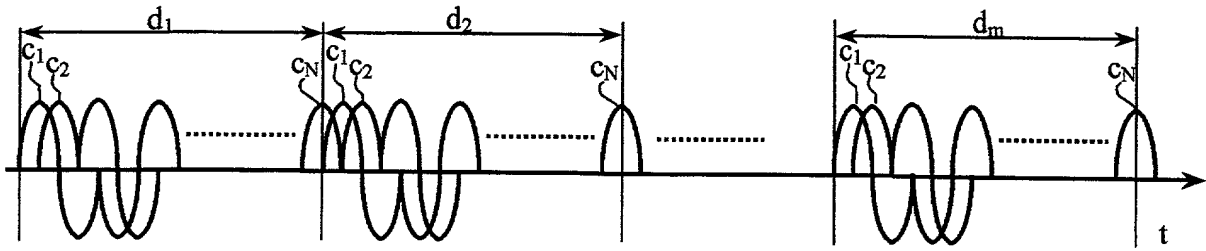


FIG. 23A

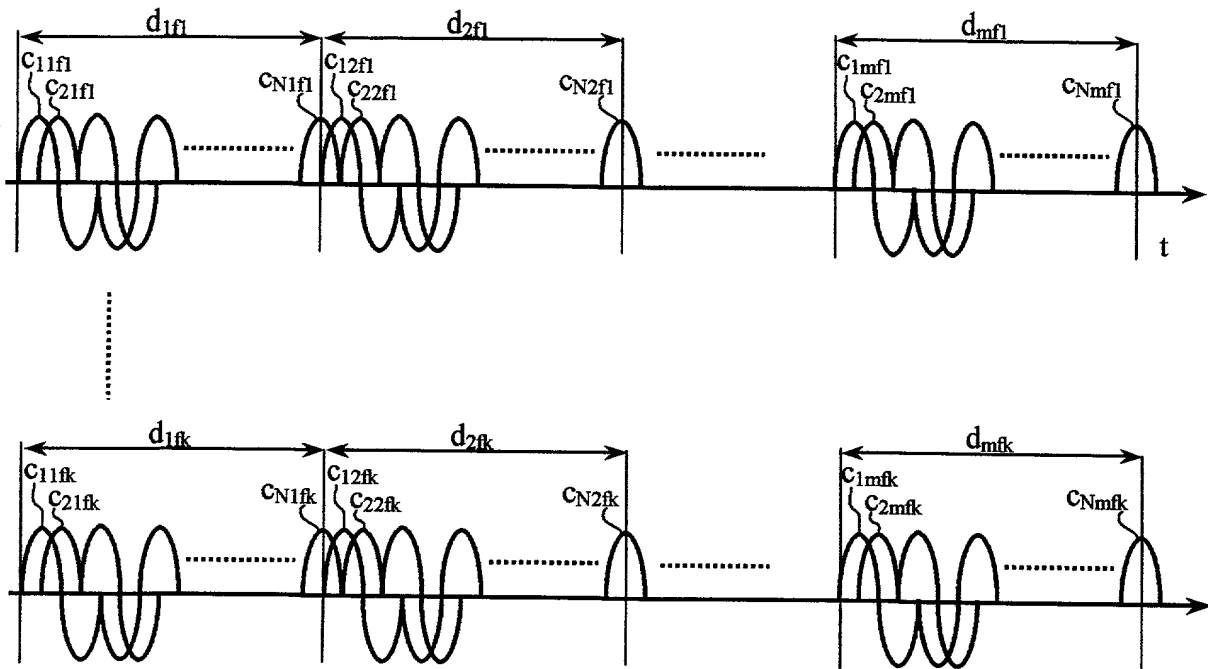


FIG. 23B

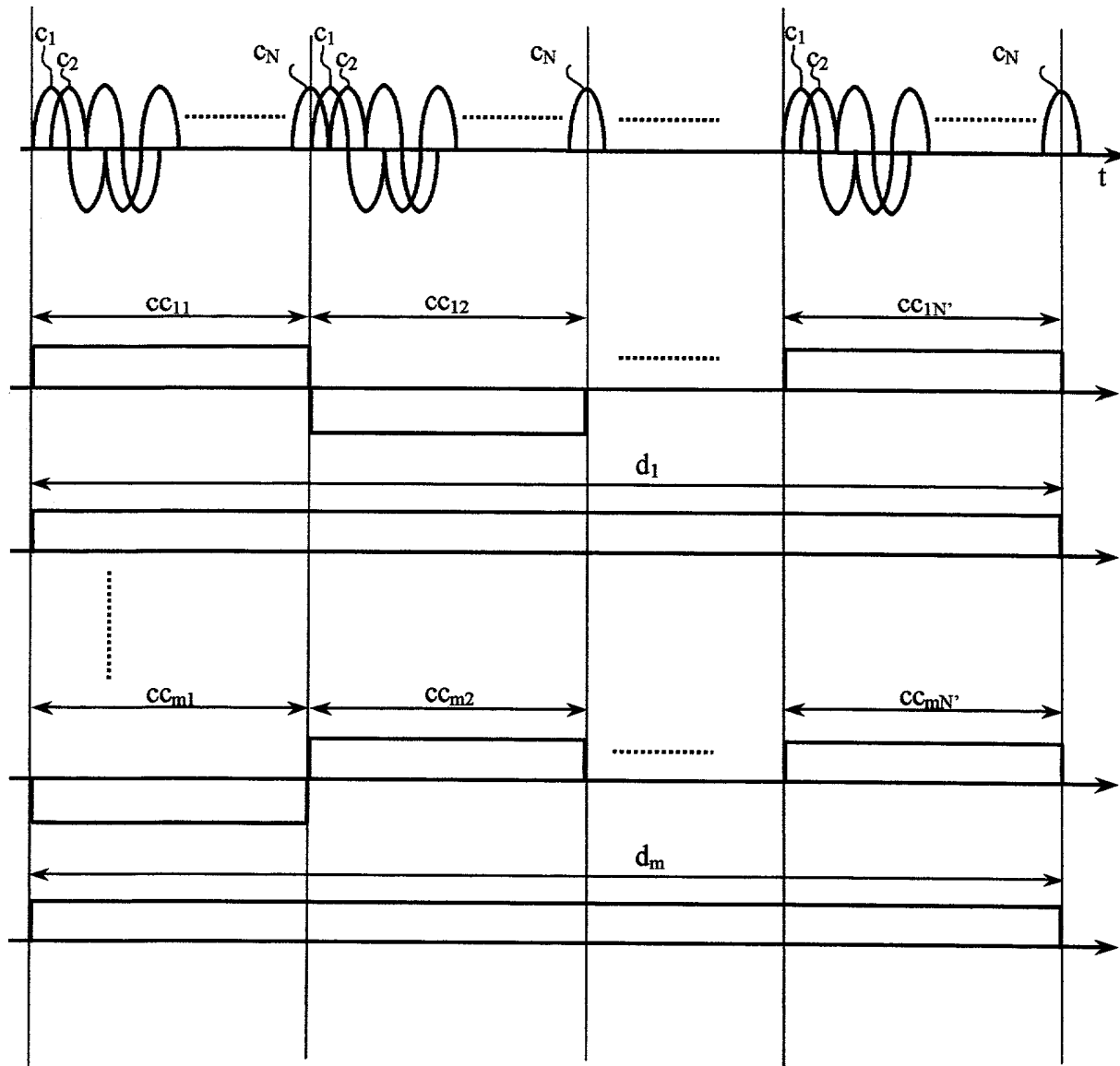


FIG. 24

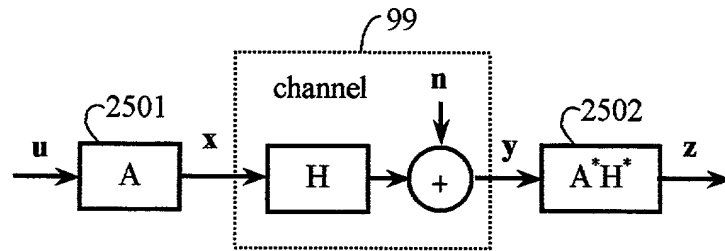


FIG. 25A

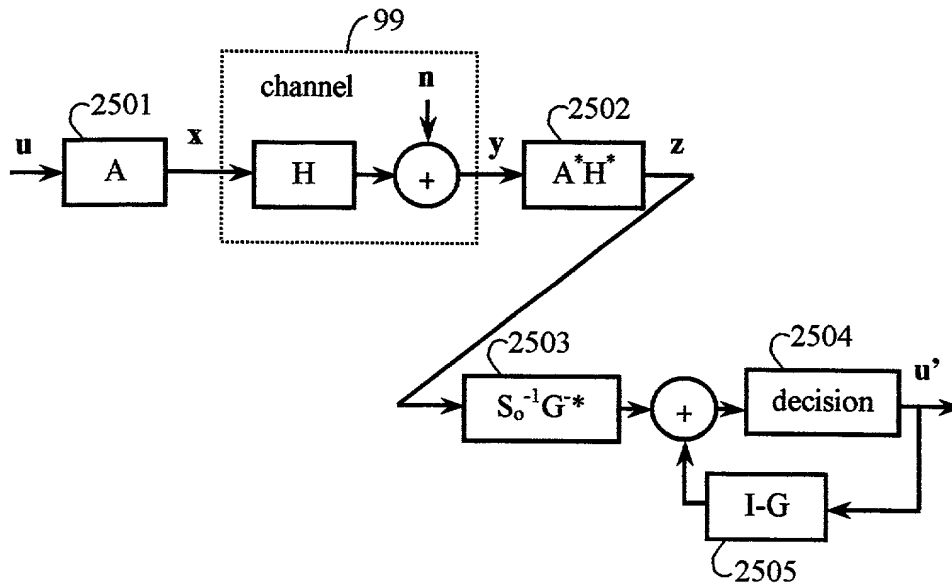


FIG. 25B

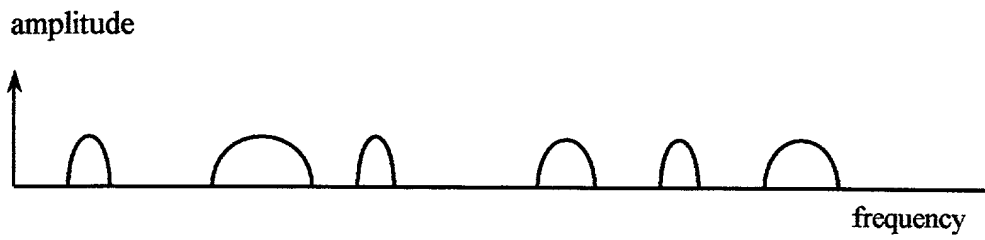


FIG. 26A

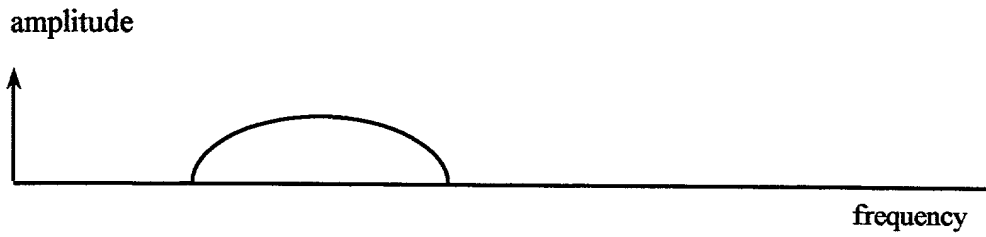


FIG. 26B

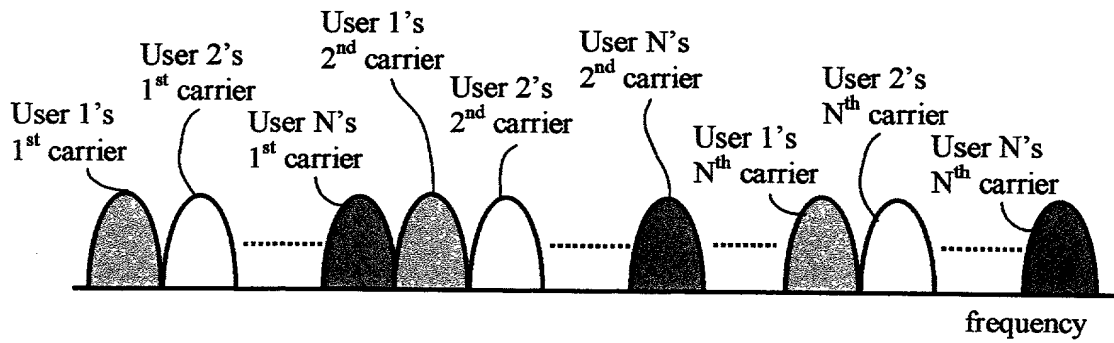


FIG. 27

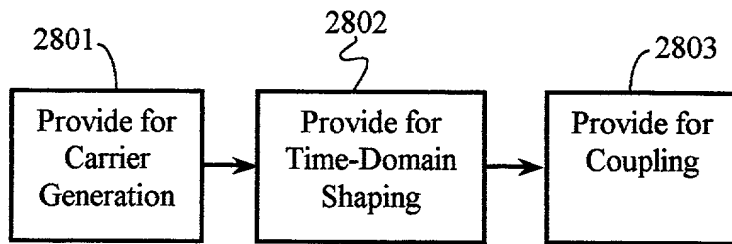


FIG. 28A

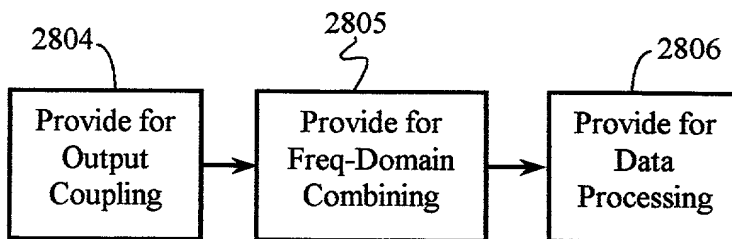


FIG. 28B

$$\begin{aligned} \text{HW}_{4 \times 4}(1): & \quad 1 & 1 & 1 & 1 \\ \text{HW}_{4 \times 4}(2): & \quad 1 & -1 & 1 & -1 \\ \text{HW}_{4 \times 4}(3): & \quad 1 & 1 & -1 & -1 \\ \text{HW}_{4 \times 4}(4): & \quad 1 & -1 & -1 & 1 \end{aligned}$$

FIG. 29A

$$\begin{aligned} \text{CL}_{4 \times 4}(1): & \quad 1 & 1 & 1 & 1 \\ \text{CL}_{4 \times 4}(2): & \quad 1 & i & -1 & -i \\ \text{CL}_{4 \times 4}(3): & \quad 1 & -1 & 1 & -1 \\ \text{CL}_{4 \times 4}(4): & \quad 1 & -i & -1 & i \end{aligned}$$

FIG. 29B

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(1): \quad 1 \quad 1 \quad 1 \quad 1$$

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(2): \quad 1 \quad i \quad -1 \quad -i$$

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(3): \quad 1 \quad -1 \quad 1 \quad -1$$

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(4): \quad 1 \quad -i \quad -1 \quad i$$

FIG. 30A

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(1): \quad 1 \quad 1 \quad -1 \quad -1$$

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(2): \quad 1 \quad i \quad 1 \quad i$$

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(3): \quad 1 \quad -1 \quad -1 \quad 1$$

$$\text{HW}_{4 \times 4}(1) \times \text{CL}_{4 \times 4}(4): \quad 1 \quad -i \quad 1 \quad -i$$

FIG. 30C

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(1): \quad 1 \quad -1 \quad 1 \quad -1$$

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(2): \quad 1 \quad -i \quad -1 \quad i$$

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(3): \quad 1 \quad 1 \quad 1 \quad 1$$

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(4): \quad 1 \quad i \quad -1 \quad -i$$

FIG. 30B

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(1): \quad 1 \quad -1 \quad -1 \quad 1$$

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(2): \quad 1 \quad -i \quad 1 \quad -i$$

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(3): \quad 1 \quad 1 \quad -1 \quad -1$$

$$\text{HW}_{4 \times 4}(2) \times \text{CL}_{4 \times 4}(4): \quad 1 \quad i \quad 1 \quad i$$

FIG. 30D

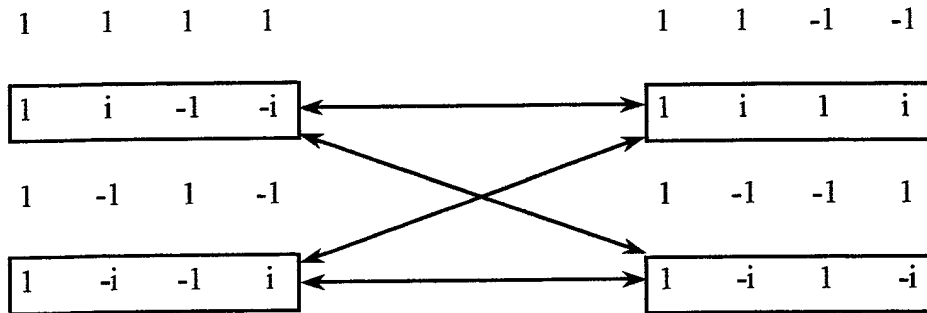


FIG. 31A

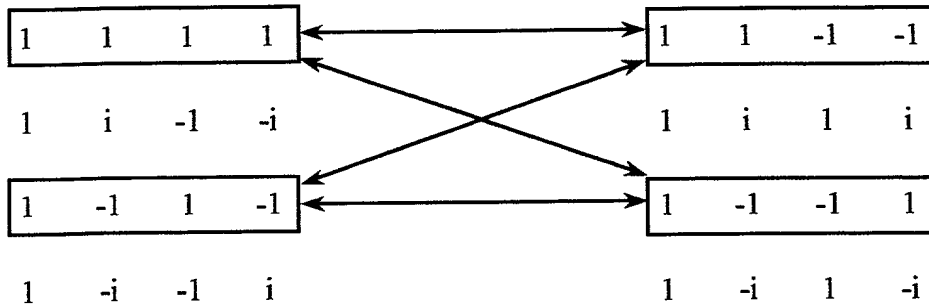


FIG. 31B

$PC_{4 \times 4}(1):$ $1 \quad i \quad -1 \quad -i$
 $PC_{4 \times 4}(2):$ $1 \quad i \quad 1 \quad i$
 $PC_{4 \times 4}(3):$ $1 \quad -i \quad -1 \quad i$
 $PC_{4 \times 4}(4):$ $1 \quad -i \quad 1 \quad -i$

FIG. 31C

$HW_{8 \times 8}(1):$	1	1	1	1	1	1	1
$HW_{8 \times 8}(2):$	1	-1	1	-1	1	-1	1
$HW_{8 \times 8}(3):$	1	1	-1	-1	1	1	-1
$HW_{8 \times 8}(4):$	1	-1	-1	1	1	-1	-1
$HW_{8 \times 8}(5):$	1	1	1	1	-1	-1	-1
$HW_{8 \times 8}(6):$	1	-1	1	-1	-1	1	-1
$HW_{8 \times 8}(7):$	1	1	-1	-1	-1	-1	1
$HW_{8 \times 8}(8):$	1	-1	-1	1	-1	1	1

FIG. 32A

$PC4_{8 \times 8}(1):$	1	i	-1	-i	1	i	-1
$PC4_{8 \times 8}(2):$	1	i	1	i	1	i	1
$PC4_{8 \times 8}(3):$	1	-i	-1	i	1	-i	-1
$PC4_{8 \times 8}(4):$	1	-i	1	-i	1	-i	1
$PC4_{8 \times 8}(5):$	1	i	-1	-i	-1	-i	1
$PC4_{8 \times 8}(6):$	1	i	1	i	-1	-i	-1
$PC4_{8 \times 8}(7):$	1	-i	-1	i	-1	i	1
$PC4_{8 \times 8}(8):$	1	-i	1	-i	-1	i	-1

FIG. 32B

$CI_{8 \times 8}(1):$	1	1	1	1	1	1	1	1
$CI_{8 \times 8}(2):$	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$	-1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$
$CI_{8 \times 8}(3):$	1	i	-1	-i	1	i	-1	-i
$CI_{8 \times 8}(4):$	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$	-1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$
$CI_{8 \times 8}(5):$	1	-1	1	-1	1	-1	1	-1
$CI_{8 \times 8}(6):$	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$	-1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$
$CI_{8 \times 8}(7):$	1	-i	-1	i	1	-i	-1	i
$CI_{8 \times 8}(8):$	1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$	-1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$

FIG. 32C

HW_{8x8}(1)xCI_{8x8}

HW _{8x8} (1):	1	1	1	1	1	1	1	1
CI _{8x8} (1):	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$	-1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$
PC4 _{8x8} (1):	1	i	-1	-i	1	i	-1	-i
CI _{8x8} (2):	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$	-1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$
HW _{8x8} (2):	1	-1	1	-1	1	-1	1	-1
CI _{8x8} (2)*:	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$	-1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$
PC4 _{8x8} (3):	1	-i	-1	i	1	-i	-1	i
CI _{8x8} (1)*:	1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$	-1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$

FIG. 33A

HW_{8x8}(2)xCI_{8x8}

HW _{8x8} (2):	1	-1	1	-1	1	-1	1	-1
CI _{8x8} (2)*:	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$	-1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$
PC4 _{8x8} (3):	1	-i	-1	i	1	-i	-1	i
CI _{8x8} (1)*:	1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$	-1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$
HW _{8x8} (1):	1	1	1	1	1	1	1	1
CI _{8x8} (1):	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$	-1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$
PC4 _{8x8} (1):	1	i	-1	-i	1	i	-1	-i
CI _{8x8} (2):	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$	-1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$

FIG. 33B

HW_{8x8}(3)xCI_{8x8}

HW _{8x8} (3):	1	1	-1	-1	1	1	-1	-1
CI _{8x8} (6):	1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$	-1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$
PC _{4x8} (2):	1	i	1	i	1	i	1	i
CI _{8x8} (5):	1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$	-1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$
HW _{8x8} (4):	1	-1	-1	1	1	-1	-1	1
CI _{8x8} (5)*:	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$	-1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$
PC _{4x8} (4):	1	-i	1	-i	1	-i	1	-i
CI _{8x8} (6)*:	1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$	-1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$

FIG. 33C

HW_{8x8}(4)xCI_{8x8}

HW _{8x8} (4):	1	-1	-1	1	1	-1	-1	1
CI _{8x8} (5):	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$	-1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$
PC _{4x8} (4):	1	-i	1	-i	1	-i	1	-i
CI _{8x8} (6):	1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$	-1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$
HW _{8x8} (3):	1	1	-1	-1	1	1	-1	-1
CI _{8x8} (6)*:	1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$	-1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$
PC _{4x8} (2):	1	i	1	i	1	i	1	i
CI _{8x8} (5)*:	1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$	-1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$

FIG. 33D

HW_{8x8}(5)xCI_{8x8}

HW _{8x8} (5):	1	1	1	1	-1	-1	-1	-1
CI _{8x8} (3):	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$
PC4 _{8x8} (5):	1	i	-1	-i	-1	-i	1	i
CI _{8x8} (4):	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$
HW _{8x8} (6):	1	-1	1	-1	-1	1	-1	1
CI _{8x8} (4)*:	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$
PC4 _{8x8} (7):	1	-i	-1	i	-1	i	1	-i
CI _{8x8} (3)*:	1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$	1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$

FIG. 33E

HW_{8x8}(6)xCI_{8x8}

HW _{8x8} (6):	1	-1	1	-1	-1	1	-1	1
CI _{8x8} (4)*:	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$	1	$\frac{-1-i}{\sqrt{2}}$	i	$\frac{1-i}{\sqrt{2}}$
PC4 _{8x8} (7):	1	-i	-1	i	-1	i	1	-i
CI _{8x8} (3)*:	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$	1	$\frac{1-i}{\sqrt{2}}$	-i	$\frac{-1-i}{\sqrt{2}}$
HW _{8x8} (5):	1	1	1	1	-1	-1	-1	-1
CI _{8x8} (3):	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$	1	$\frac{1+i}{\sqrt{2}}$	i	$\frac{-1+i}{\sqrt{2}}$
PC4 _{8x8} (5):	1	i	-1	-i	-1	-i	1	i
CI _{8x8} (4):	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$	1	$\frac{-1+i}{\sqrt{2}}$	-i	$\frac{1+i}{\sqrt{2}}$

FIG. 33F

HW_{8x8}(7)xCI_{8x8}

HW _{8x8} (7):	1	1	-1	-1	-1	-1	1	1
CI _{8x8} (7):	1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$	1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$
PC4 _{8x8} (6):	1	i	1	i	-1	-i	-1	-i
CI _{8x8} (8):	1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$	1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$
HW _{8x8} (8):	1	-1	-1	1	-1	1	1	-1
CI _{8x8} (8)*:	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$
PC4 _{8x8} (8):	1	-i	1	-i	-1	i	-1	i
CI _{8x8} (7)*:	1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$	1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$

FIG. 33G

HW_{8x8}(8)xCI_{8x8}

HW _{8x8} (8):	1	-1	-1	1	-1	1	1	-1
CI _{8x8} (8)*:	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$	1	$\frac{-1-i}{\sqrt{2}}$	-i	$\frac{-1+i}{\sqrt{2}}$
PC4 _{8x8} (8):	1	-i	1	-i	-1	i	-1	i
CI _{8x8} (7)*:	1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$	1	$\frac{1-i}{\sqrt{2}}$	i	$\frac{1+i}{\sqrt{2}}$
HW _{8x8} (7):	1	1	-1	-1	-1	-1	1	1
CI _{8x8} (7):	1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$	1	$\frac{1+i}{\sqrt{2}}$	-i	$\frac{1-i}{\sqrt{2}}$
PC4 _{8x8} (6):	1	i	1	i	-1	-i	-1	-i
CI _{8x8} (8):	1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$	1	$\frac{-1+i}{\sqrt{2}}$	i	$\frac{-1-i}{\sqrt{2}}$

FIG. 33H

$$\begin{aligned}
 C(1) &= [1 (1+i)/\sqrt{2} \ i (-1+i)/\sqrt{2} \ -1 (-1-i)/\sqrt{2} \ -i (1-i)/\sqrt{2}]; \\
 C(1)^* &= [1 (1-i)/\sqrt{2} \ -i (-1-i)/\sqrt{2} \ -1 (-1+i)/\sqrt{2} \ i (1+i)/\sqrt{2}]; \\
 C(2) &= [1 (-1+i)/\sqrt{2} \ -i (1+i)/\sqrt{2} \ -1 (1-i)/\sqrt{2} \ i (-1-i)/\sqrt{2}]; \\
 C(2)^* &= [1 (-1-i)/\sqrt{2} \ i (1-i)/\sqrt{2} \ -1 (1+i)/\sqrt{2} \ -i (-1+i)/\sqrt{2}]; \\
 C(3) &= [1 (1+i)/\sqrt{2} \ i (-1+i)/\sqrt{2} \ 1 (1+i)/\sqrt{2} \ i (-1+i)/\sqrt{2}]; \\
 C(3)^* &= [1 (1-i)/\sqrt{2} \ -i (-1-i)/\sqrt{2} \ 1 (1-i)/\sqrt{2} \ -i (-1-i)/\sqrt{2}]; \\
 C(4) &= [1 (-1+i)/\sqrt{2} \ i (-1-i)/\sqrt{2} \ 1 (-1+i)/\sqrt{2} \ i (-1-i)/\sqrt{2}]; \\
 C(4)^* &= [1 (-1-i)/\sqrt{2} \ -i (-1+i)/\sqrt{2} \ 1 (-1-i)/\sqrt{2} \ -i (-1+i)/\sqrt{2}]; \\
 C(5) &= [1 (-1-i)/\sqrt{2} \ -i (-1+i)/\sqrt{2} \ -1 (1+i)/\sqrt{2} \ i (1-i)/\sqrt{2}]; \\
 C(5)^* &= [1 (-1+i)/\sqrt{2} \ i (-1-i)/\sqrt{2} \ -1 (1-i)/\sqrt{2} \ -i (1+i)/\sqrt{2}]; \\
 C(6) &= [1 (1-i)/\sqrt{2} \ i (1+i)/\sqrt{2} \ -1 (-1+i)/\sqrt{2} \ -i (-1-i)/\sqrt{2}]; \\
 C(6)^* &= [1 (1+i)/\sqrt{2} \ -i (1-i)/\sqrt{2} \ -1 (-1-i)/\sqrt{2} \ i (-1+i)/\sqrt{2}]; \\
 C(7) &= [1 (1+i)/\sqrt{2} \ -i (1-i)/\sqrt{2} \ 1 (1+i)/\sqrt{2} \ -i (1-i)/\sqrt{2}]; \\
 C(7)^* &= [1 (1-i)/\sqrt{2} \ i (1+i)/\sqrt{2} \ 1 (1-i)/\sqrt{2} \ i (1+i)/\sqrt{2}]; \\
 C(8) &= [1 (-1+i)/\sqrt{2} \ -i (1+i)/\sqrt{2} \ 1 (-1+i)/\sqrt{2} \ -i (1+i)/\sqrt{2}]; \\
 C(8)^* &= [1 (-1-i)/\sqrt{2} \ i (1-i)/\sqrt{2} \ 1 (-1-i)/\sqrt{2} \ i (1-i)/\sqrt{2}];
 \end{aligned}$$

FIG. 34A

	C(1)	C(1)*	C(2)	C(2)*	C(3)	C(3)*	C(4)	C(4)*	C(5)	C(5)*	C(6)	C(6)*	C(7)	C(7)*	C(8)	C(8)*
CI(1)	0	8	0	0	0	0	0	0	4-4i	0	0	4+4i	0	0	0	0
CI(1)*	8	0	0	0	0	0	0	0	0	4+4i	4-4i	0	0	0	0	0
CI(2)	0	0	0	8	0	0	0	0	0	4-4i	4+4i	0	0	0	0	0
CI(2)*	0	0	8	0	0	0	0	0	4+4i	0	0	4-4i	0	0	0	0
CI(3)	0	0	0	0	0	8	0	4-4i	0	0	0	0	4+4i	0	0	0
CI(3)*	0	0	0	0	8	0	4+4i	0	0	0	0	0	0	4-4i	0	0
CI(4)	0	0	0	0	0	4+4i	0	8	0	0	0	0	0	0	4-4i	0
CI(4)*	0	0	0	0	4-4i	0	8	0	0	0	0	0	0	0	0	4+4i
CI(5)	4-4i	0	0	4+4i	0	0	0	0	0	8	0	0	0	0	0	0
CI(5)*	0	4+4i	4-4i	0	0	0	0	0	8	0	0	0	0	0	0	0
CI(6)	0	4-4i	4+4i	0	0	0	0	0	0	0	0	8	0	0	0	0
CI(6)*	4+4i	0	0	4-4i	0	0	0	0	0	0	8	0	0	0	0	0
CI(7)	0	0	0	0	4+4i	0	0	0	0	0	0	0	0	8	0	4-4i
CI(7)*	0	0	0	0	0	4-4i	0	0	0	0	0	0	8	0	4+4i	0
CI(8)	0	0	0	0	0	0	4-4i	0	0	0	0	0	0	4+4i	0	8
CI(8)*	0	0	0	0	0	0	0	4+4i	0	0	0	0	4-4i	0	8	0

FIG. 34B

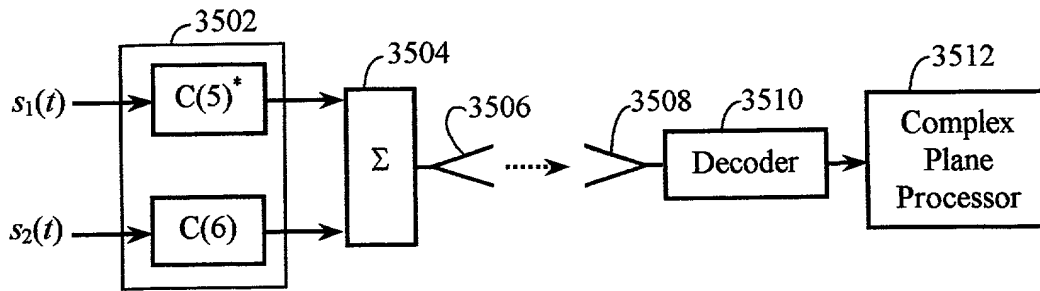


FIG. 35

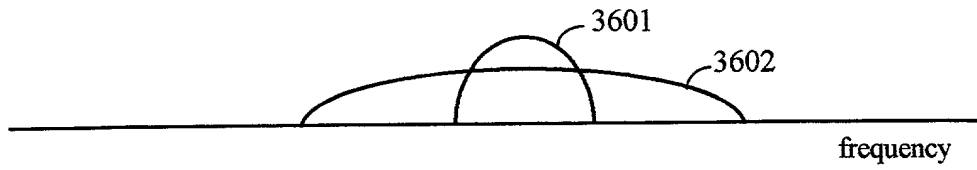


FIG. 36A

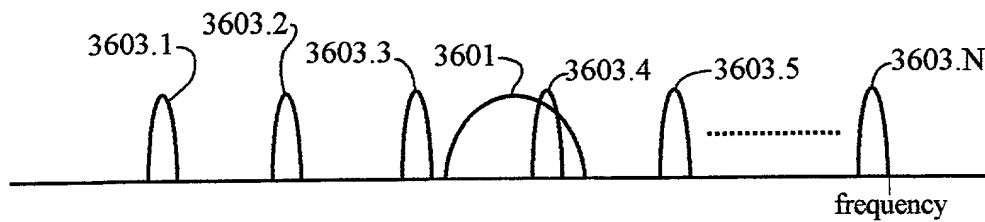


FIG. 36B

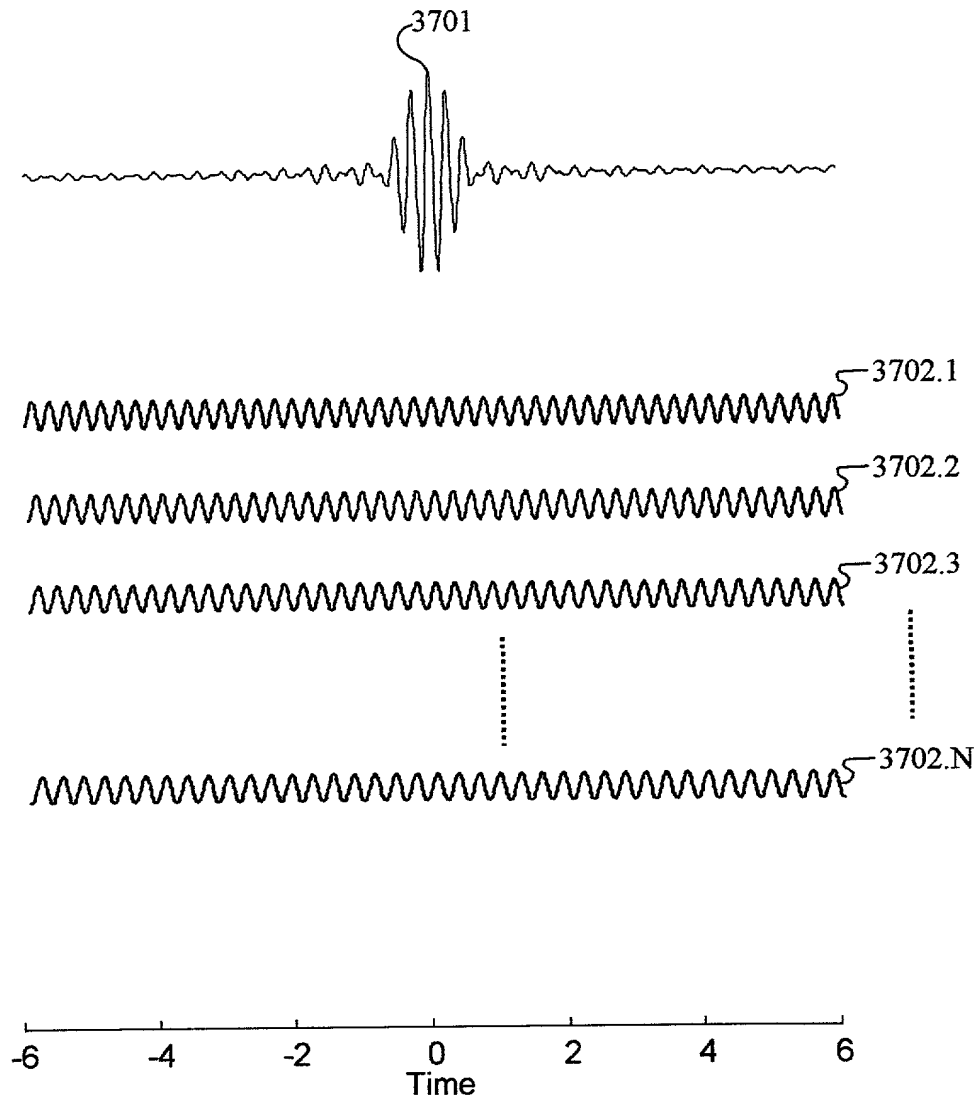


FIG. 37

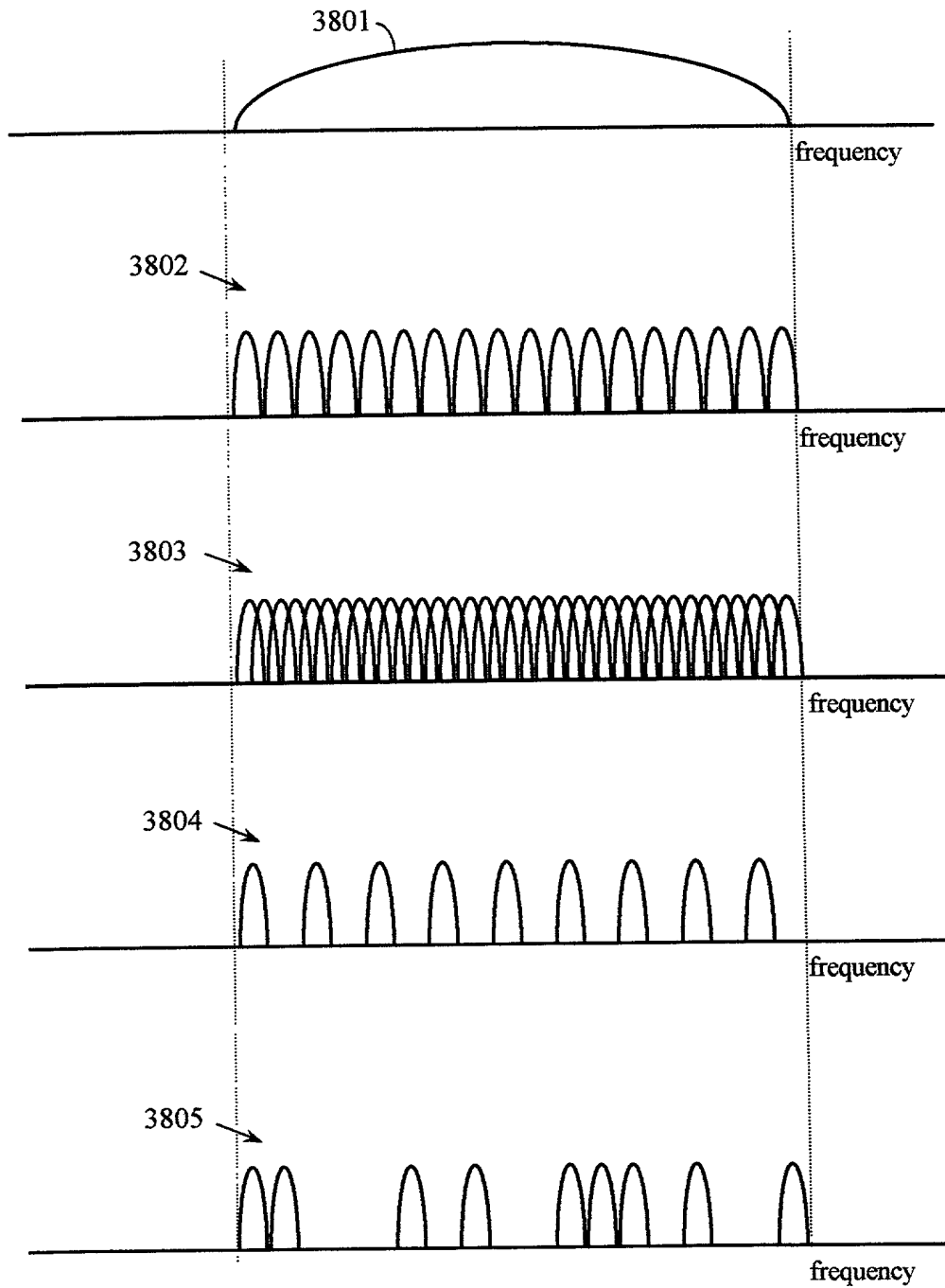


FIG. 38

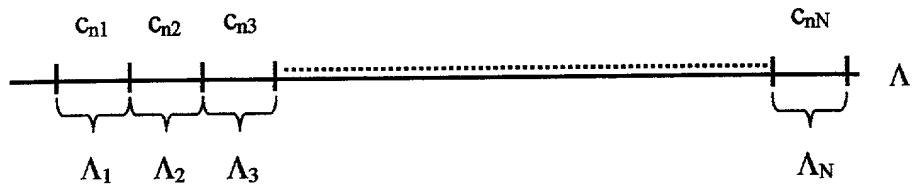


FIG. 39A

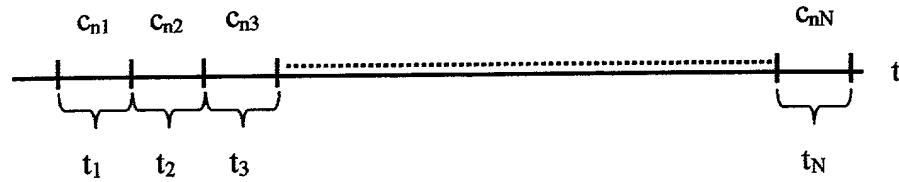


FIG. 39B

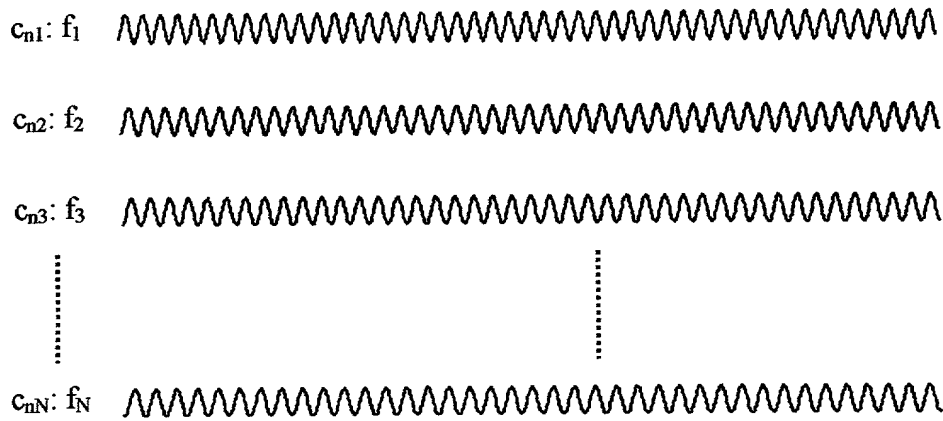


FIG. 39C

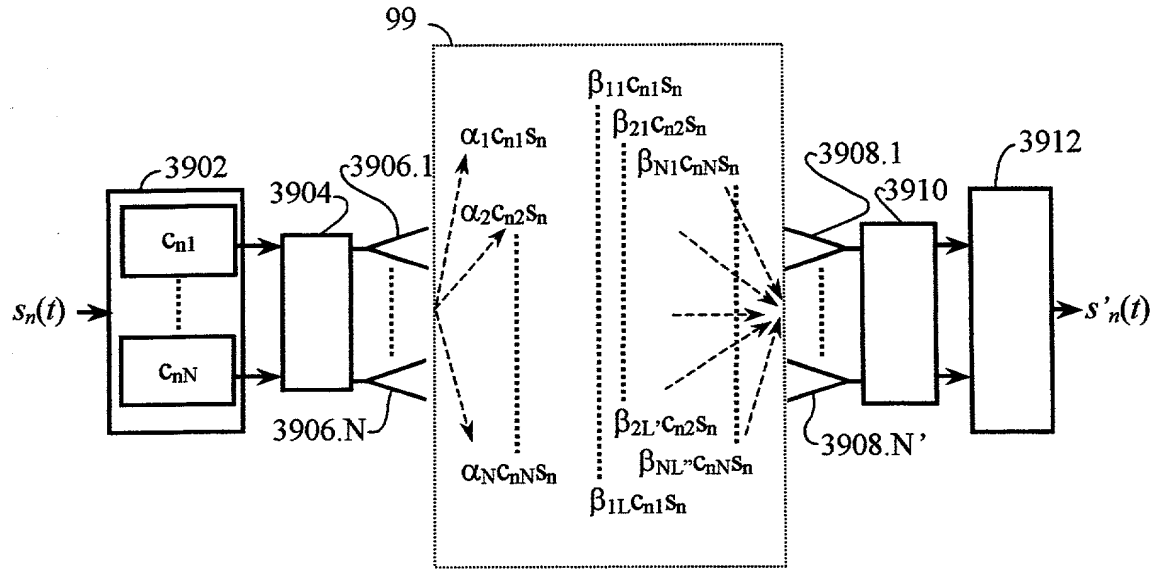


FIG. 39D

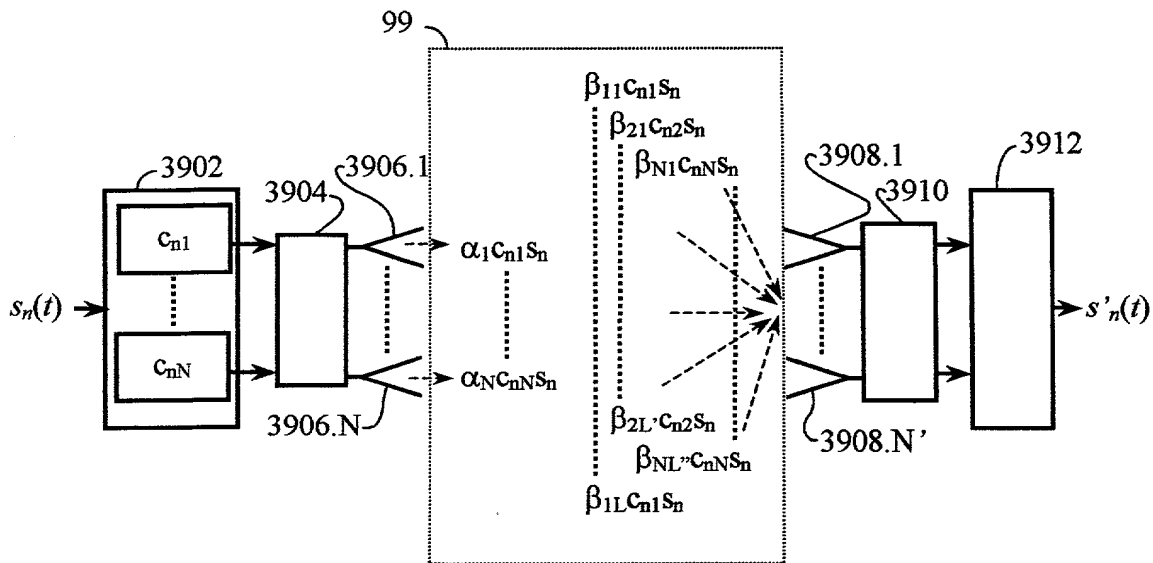


FIG. 39E

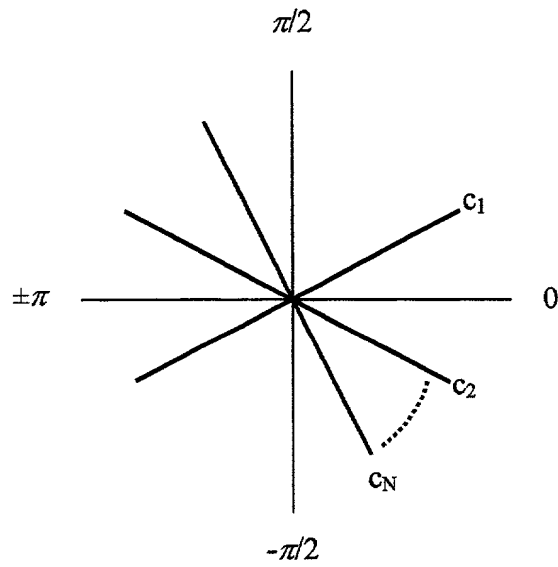


FIG. 39F

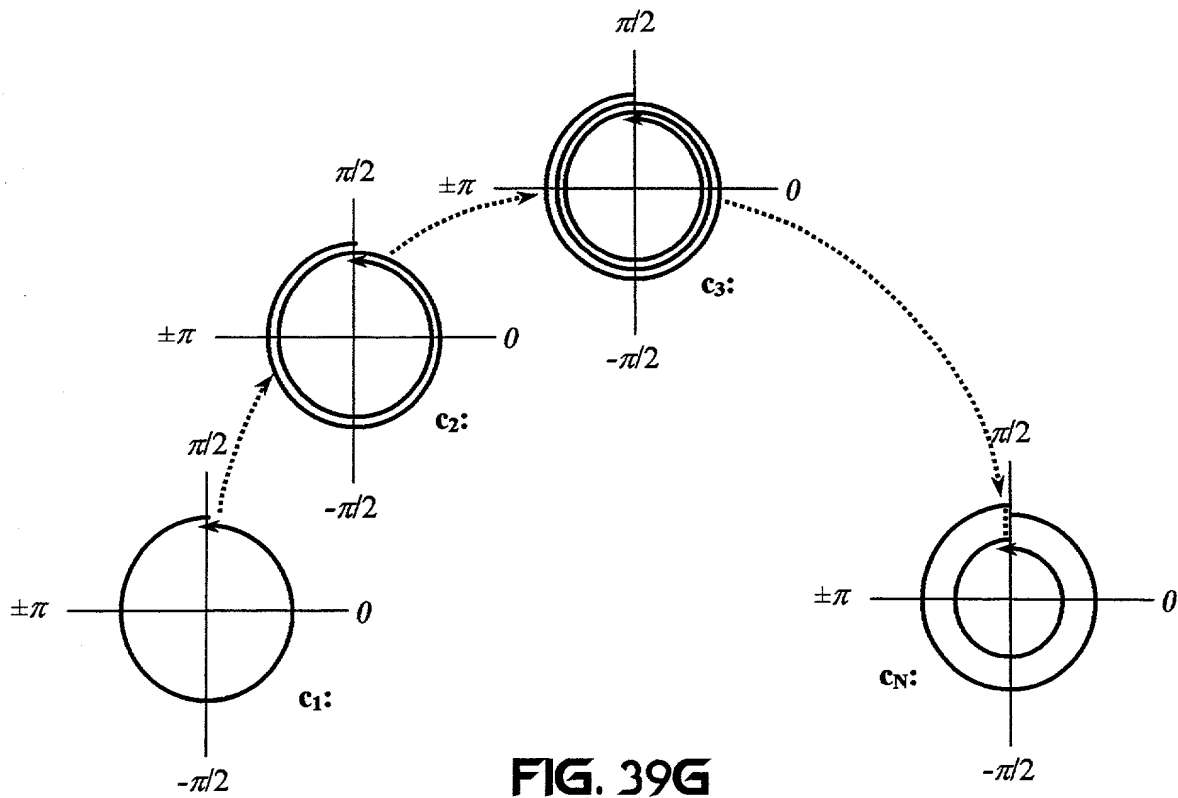


FIG. 39G

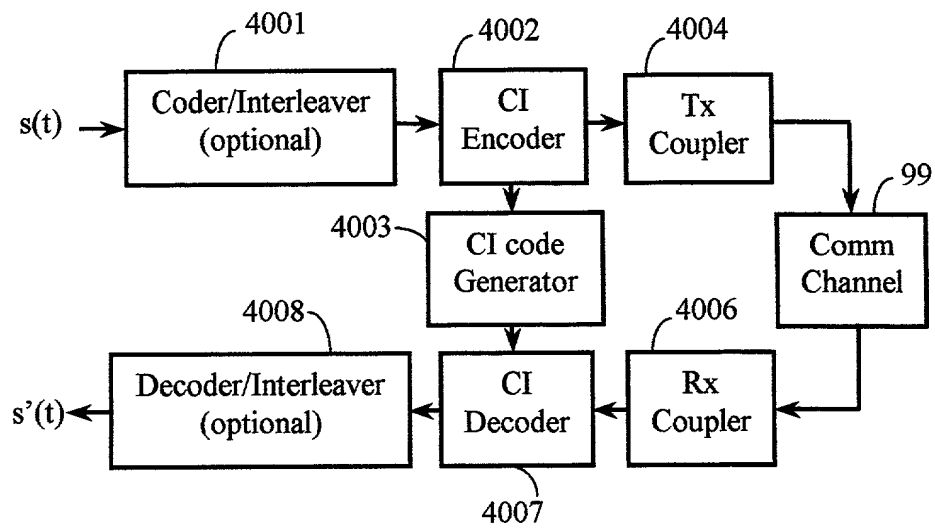


FIG. 40A

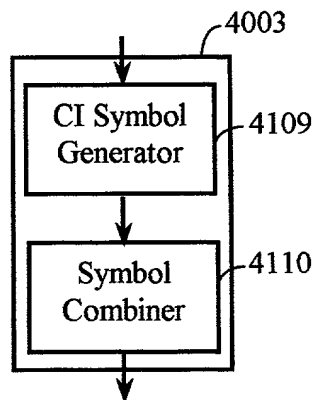


FIG. 40B

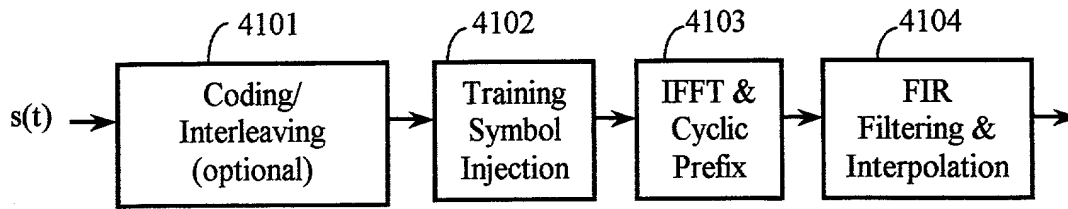


FIG. 41A

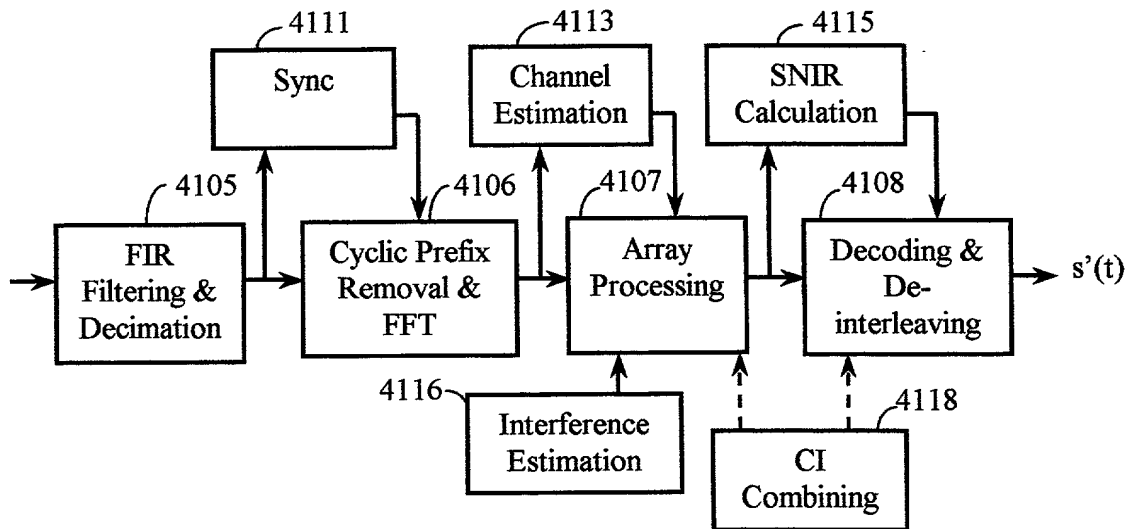


FIG. 41B

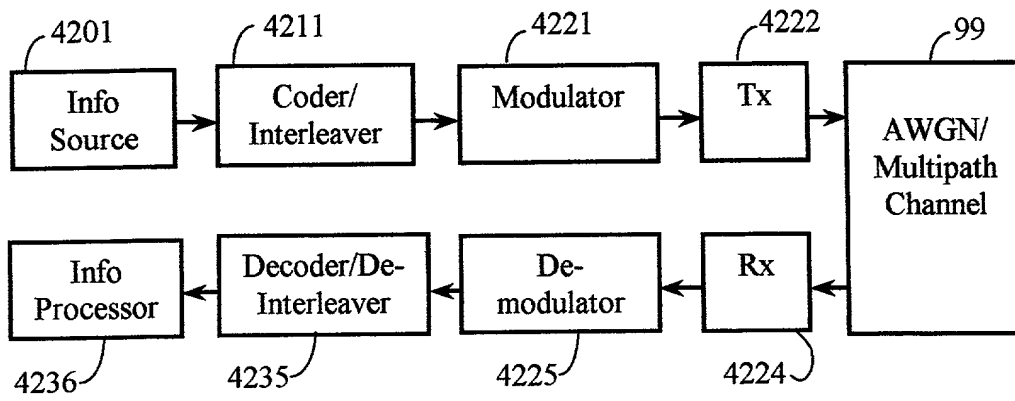


FIG. 42

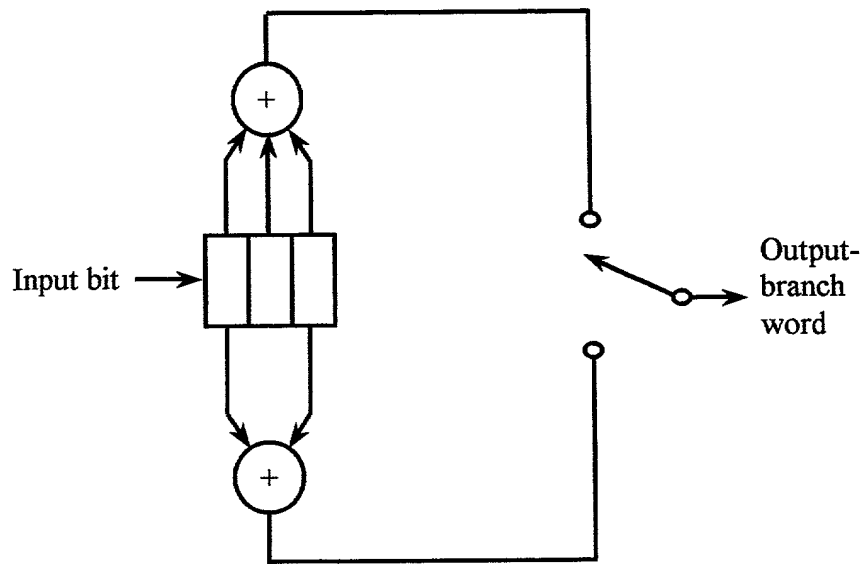


FIG. 43A

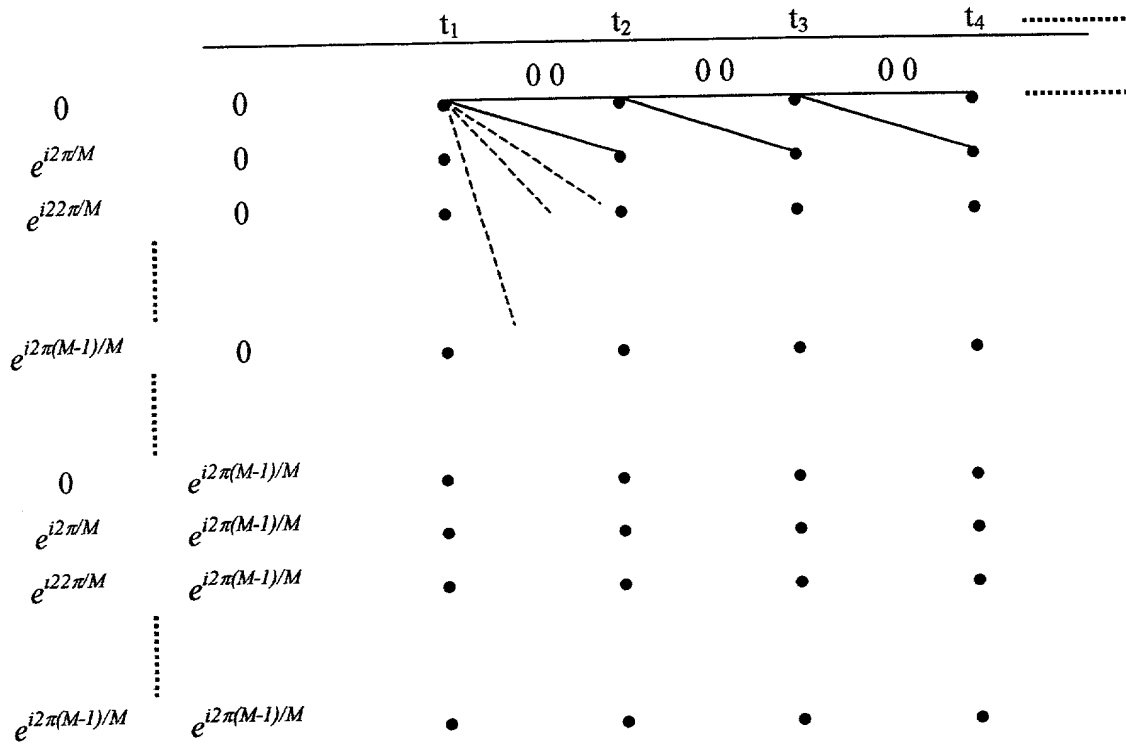


FIG. 43B

FIG. 43C

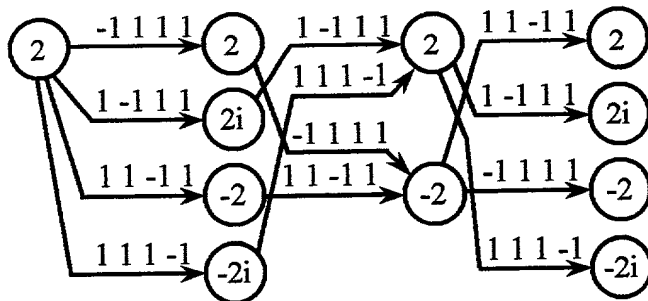
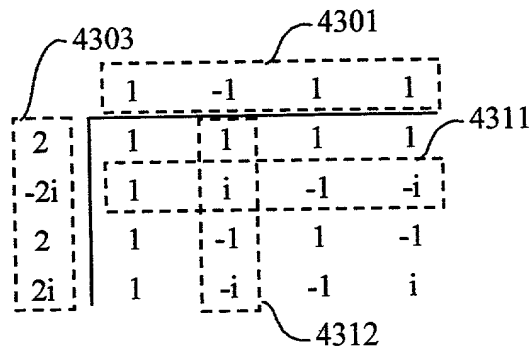


FIG. 43D

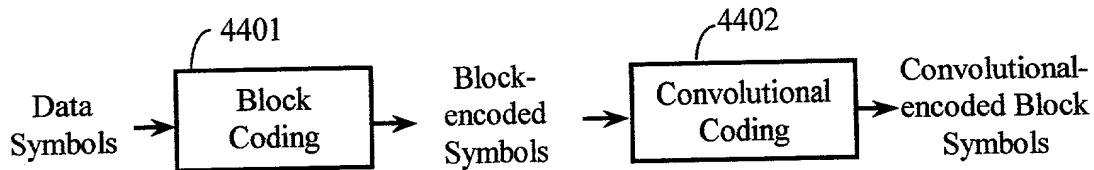


FIG. 44A

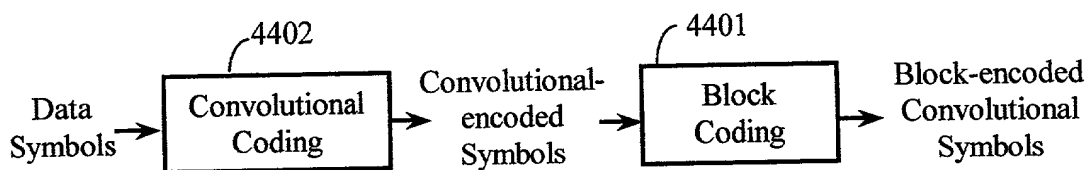


FIG. 44B

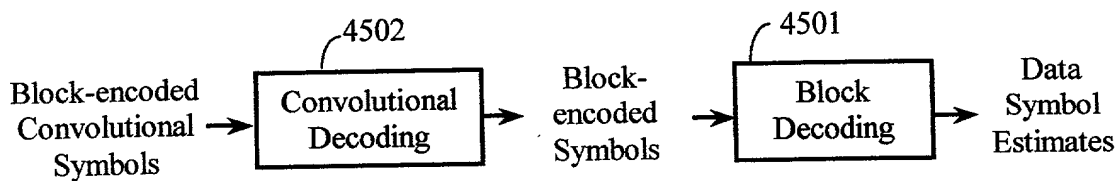


FIG. 45A

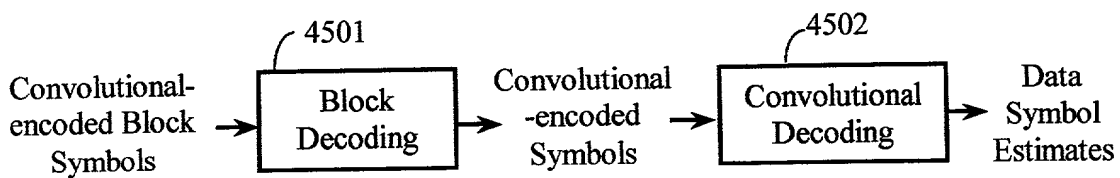


FIG. 45B

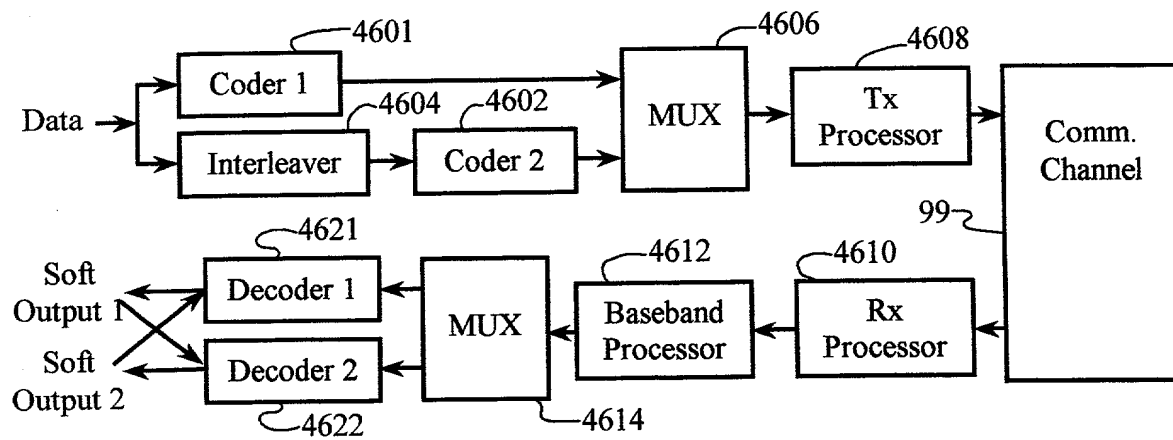


FIG. 46

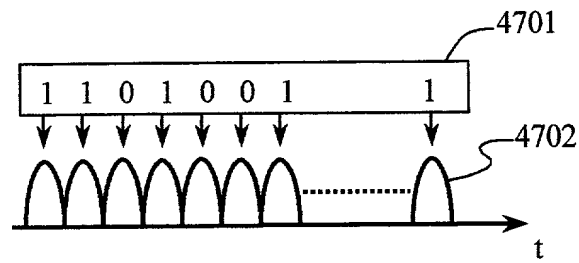


FIG. 47A

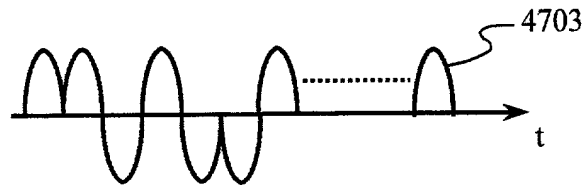


FIG. 47B

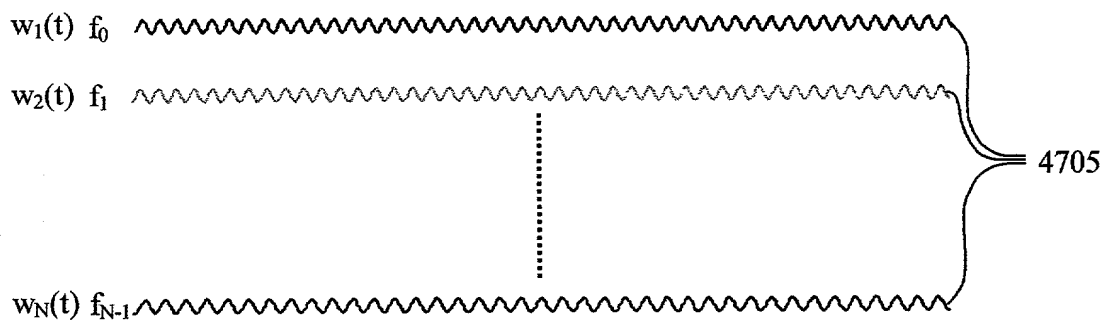


FIG. 47C

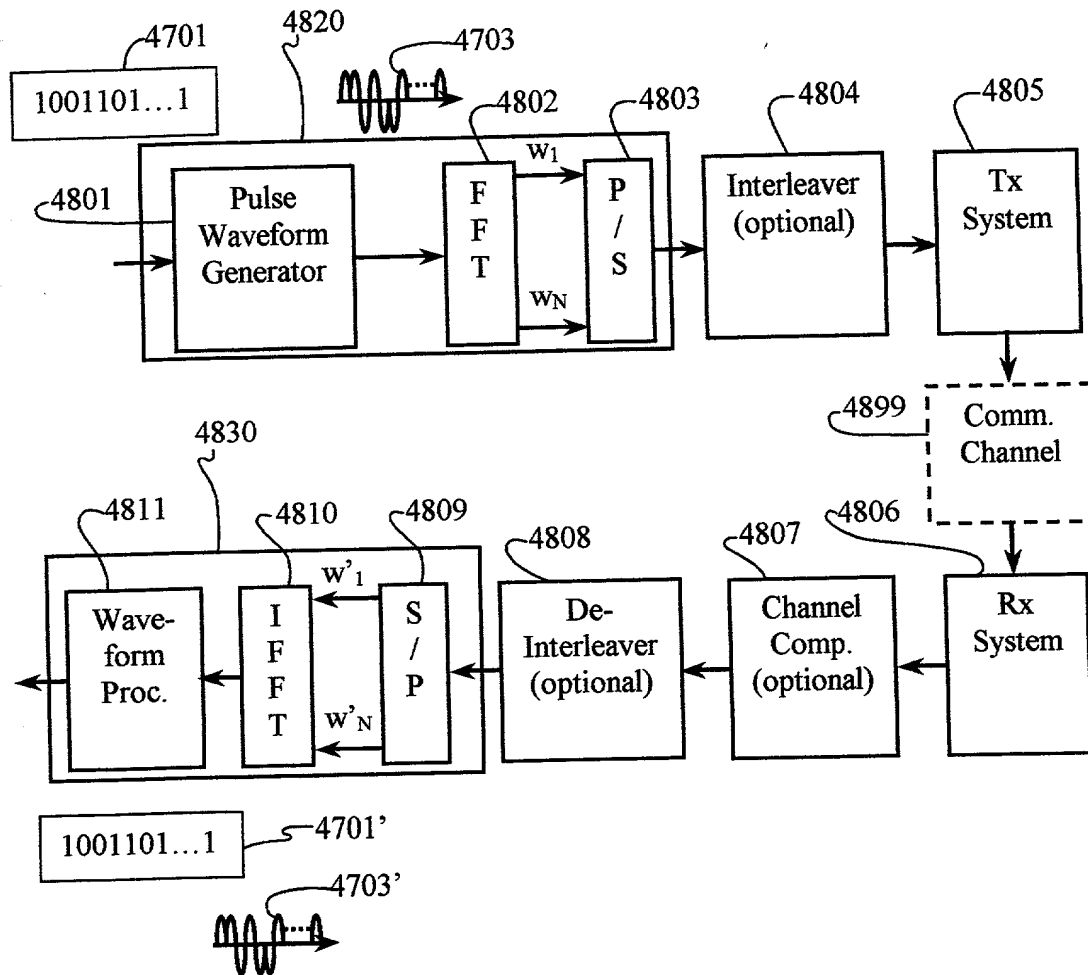


FIG. 48

	$s_0()$	$s_1()$	$s_2()$	$s_{N-1}()$
$w_1 = \Sigma():$	$e^{i2\pi(0)(0)/(N-1)}$	$e^{i2\pi(1)(0)/(N-1)}$	$e^{i2\pi(2)(0)/(N-1)}$	$e^{i2\pi(N-1)(0)/(N-1)}$
$w_2 = \Sigma():$	$e^{i2\pi(0)(1)/(N-1)}$	$e^{i2\pi(1)(1)/(N-1)}$	$e^{i2\pi(2)(1)/(N-1)}$	$e^{i2\pi(N-1)(1)/(N-1)}$
$w_3 = \Sigma():$	$e^{i2\pi(0)(2)/(N-1)}$	$e^{i2\pi(1)(2)/(N-1)}$	$e^{i2\pi(2)(2)/(N-1)}$	$e^{i2\pi(N-1)(2)/(N-1)}$
$w_N = \Sigma():$	$e^{i2\pi(0)(N-1)/(N-1)}$	$e^{i2\pi(1)(N-1)/(N-1)}$	$e^{i2\pi(2)(N-1)/(N-1)}$	$e^{i2\pi(N-1)(N-1)/(N-1)}$

FIG. 49

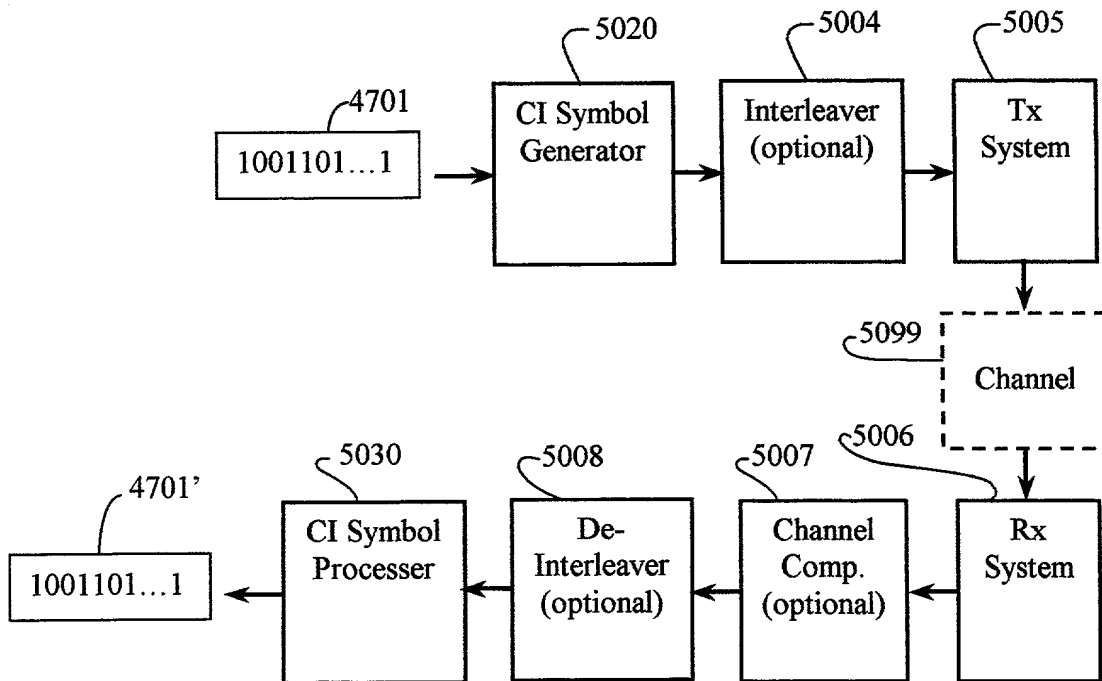


FIG. 50

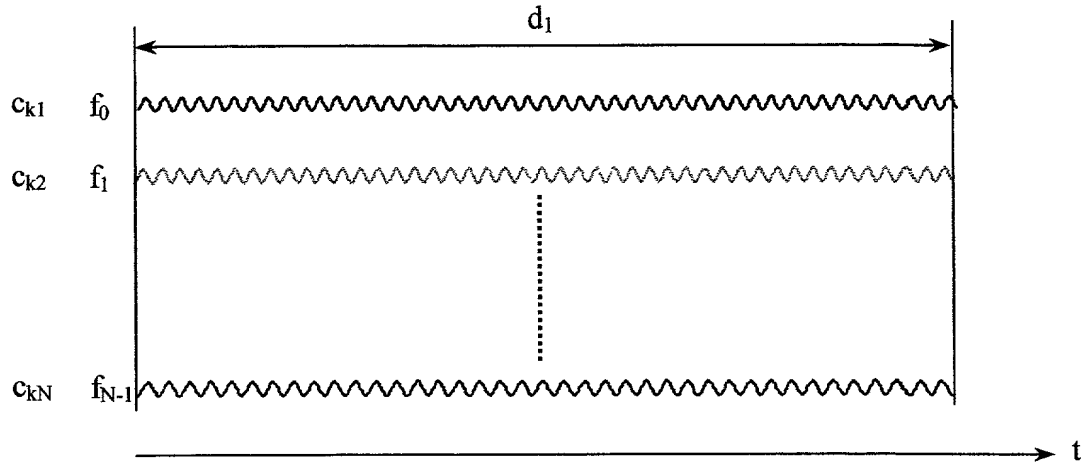


FIG. 51

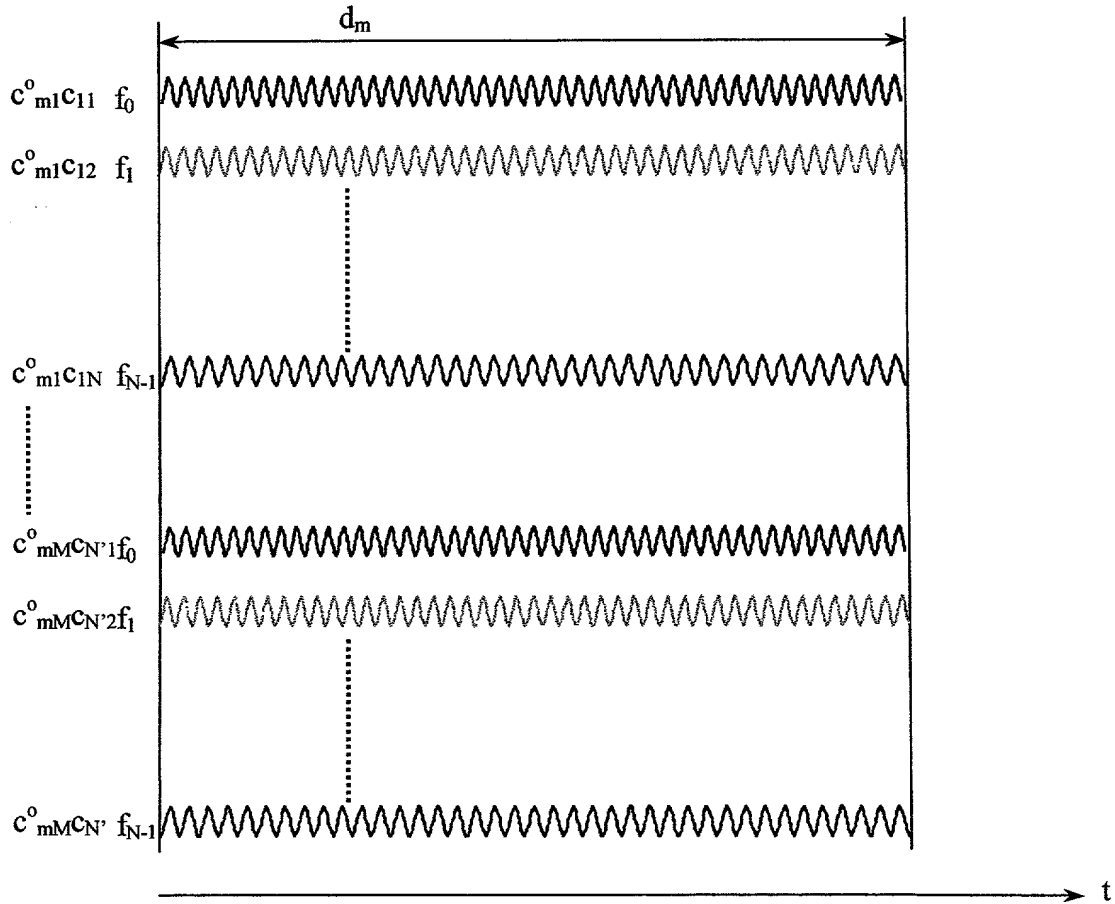


FIG. 52

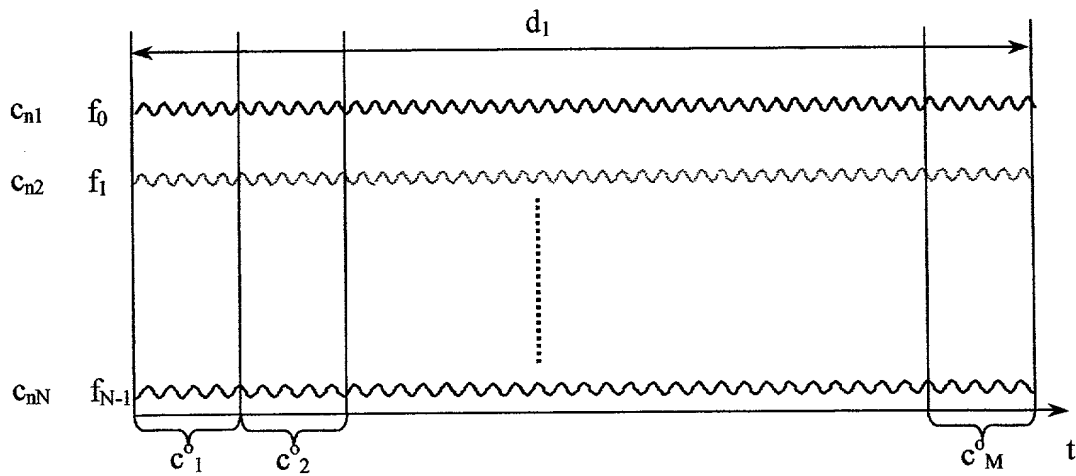


FIG. 53

	Spatial Sub-channel #1	Spatial Sub-channel #2	.....	Spatial Sub-channel #N
Code #1:	c_{11}	c_{12}	.....	c_{1N}
Code #2:	c_{21}	c_{22}	.....	c_{2N}
⋮	⋮	⋮		⋮
Code #n:	c_{n1}	c_{n2}	.....	c_{nN}
⋮	⋮	⋮		⋮
Code #N':	$c_{N'1}$	$c_{N'2}$	.....	$c_{N'N}$

FIG. 54A

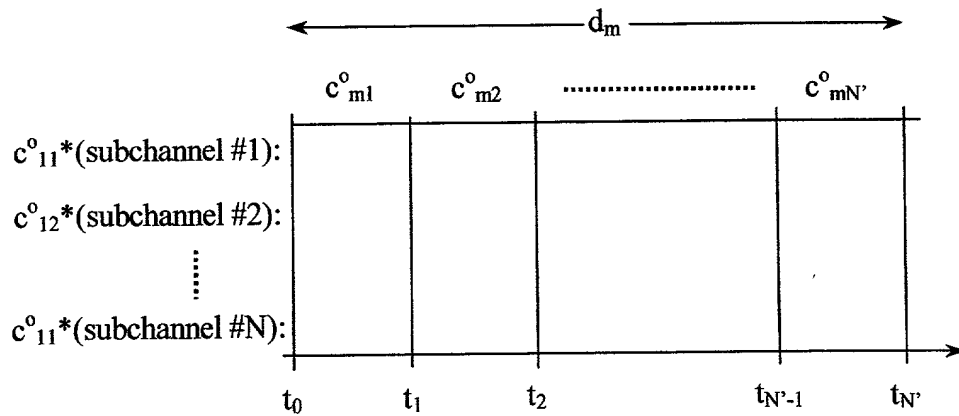


FIG. 54B

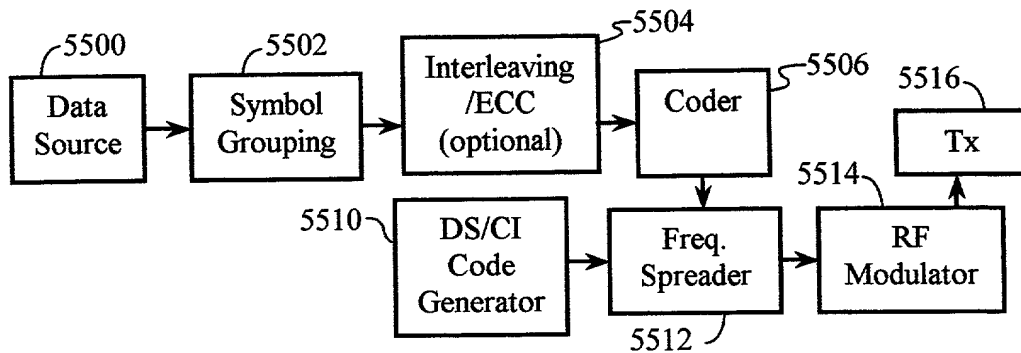


FIG. 55

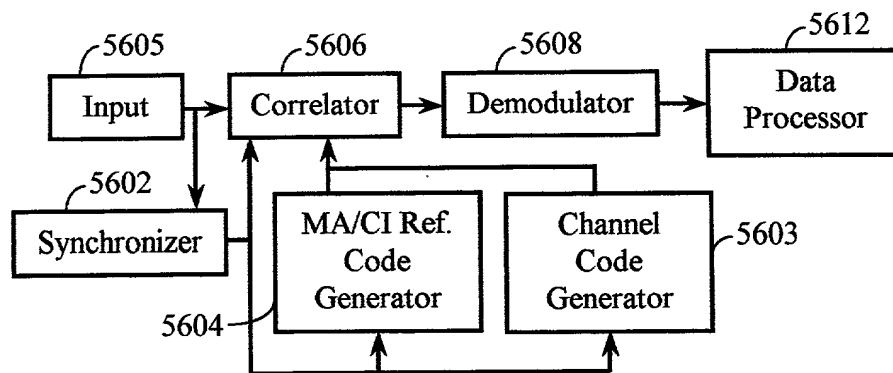


FIG. 56



FIG. 57A

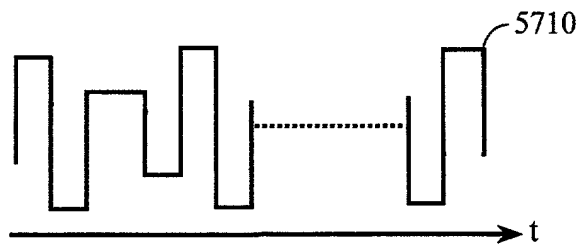


FIG. 57B

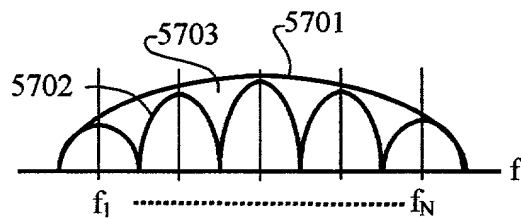


FIG. 57C

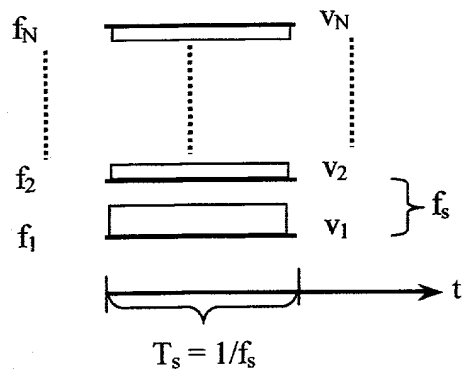


FIG. 58A

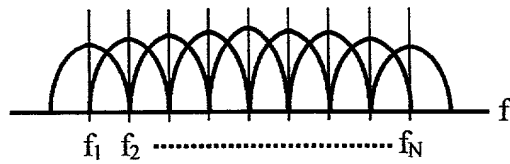


FIG. 58B

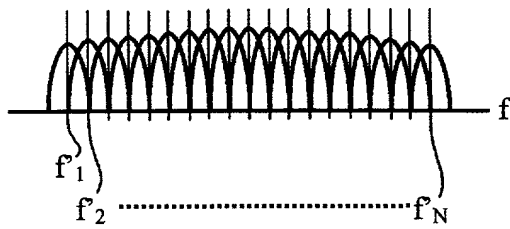


FIG. 58D

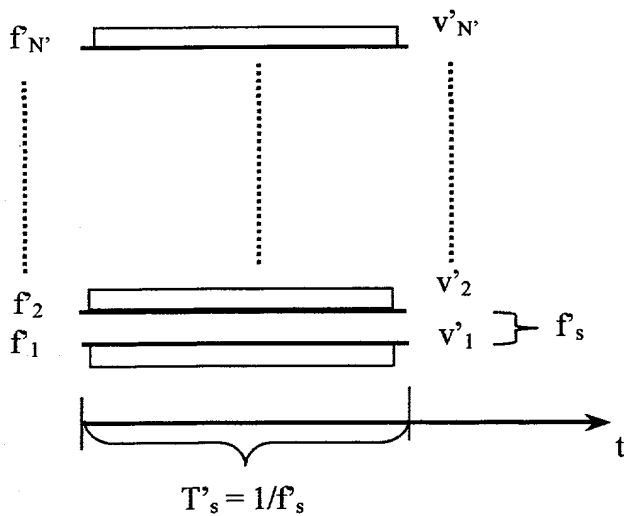


FIG. 58C

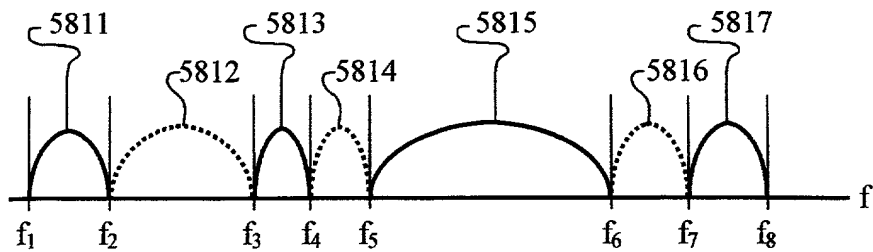


FIG. 58E

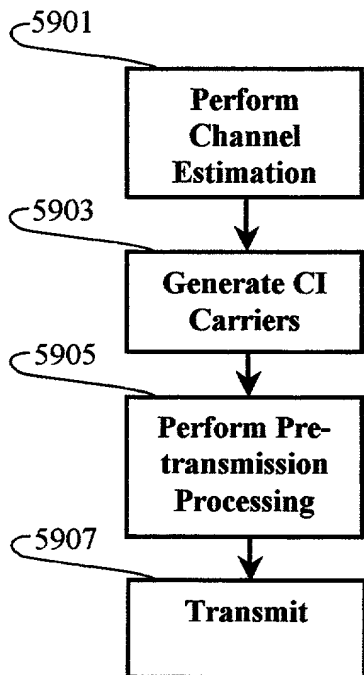


FIG. 59A

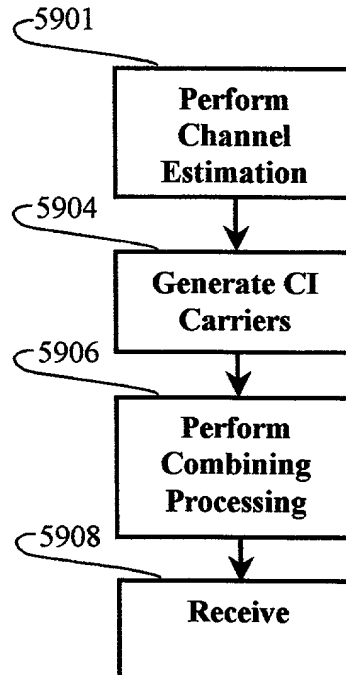


FIG. 59B

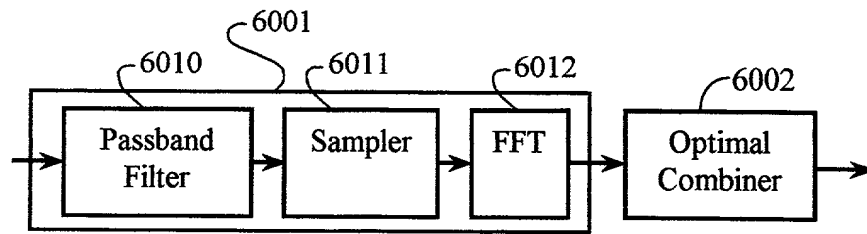


FIG. 60A

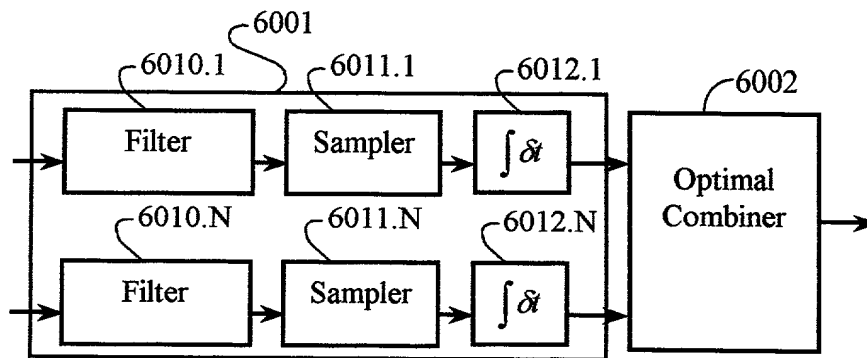


FIG. 60B

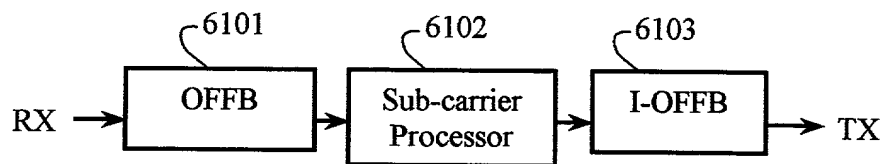


FIG. 61

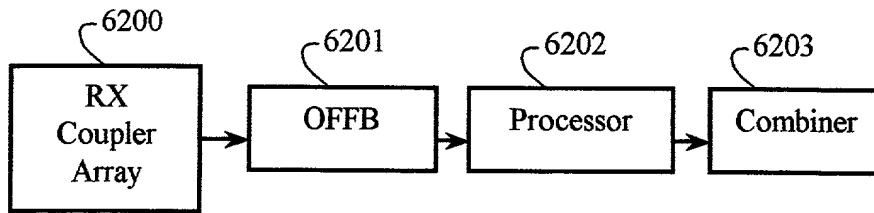


FIG. 62

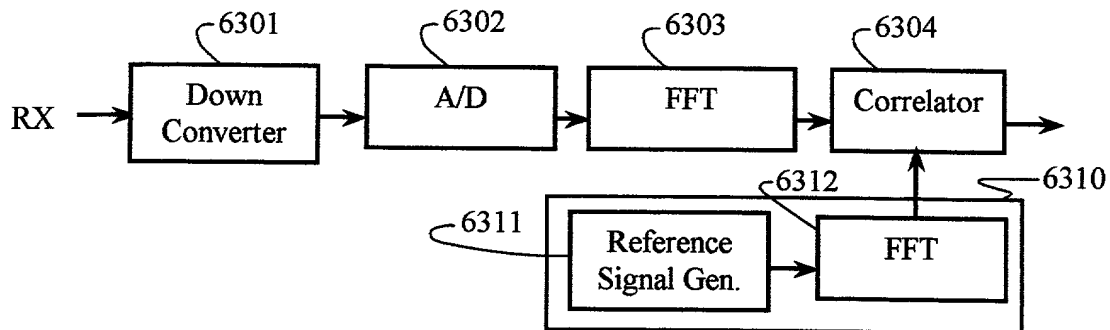


FIG. 63

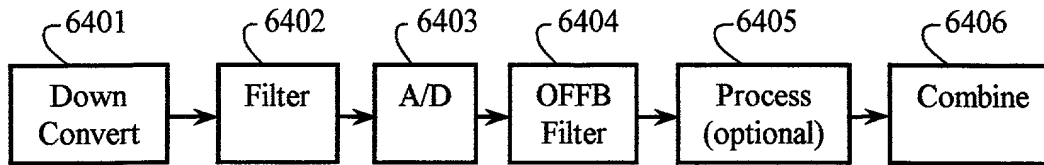


FIG. 64A

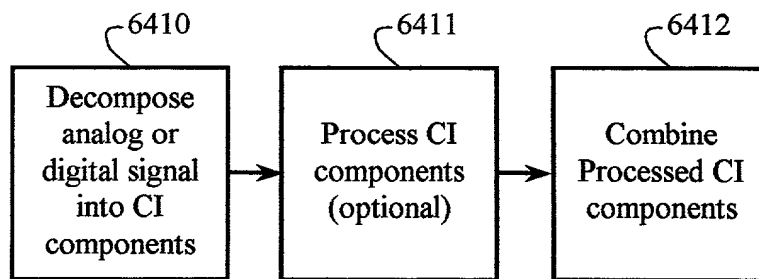


FIG. 64B

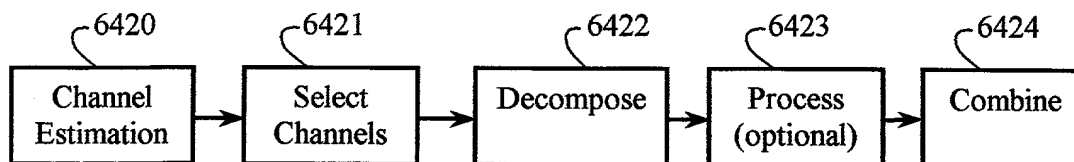


FIG. 64C

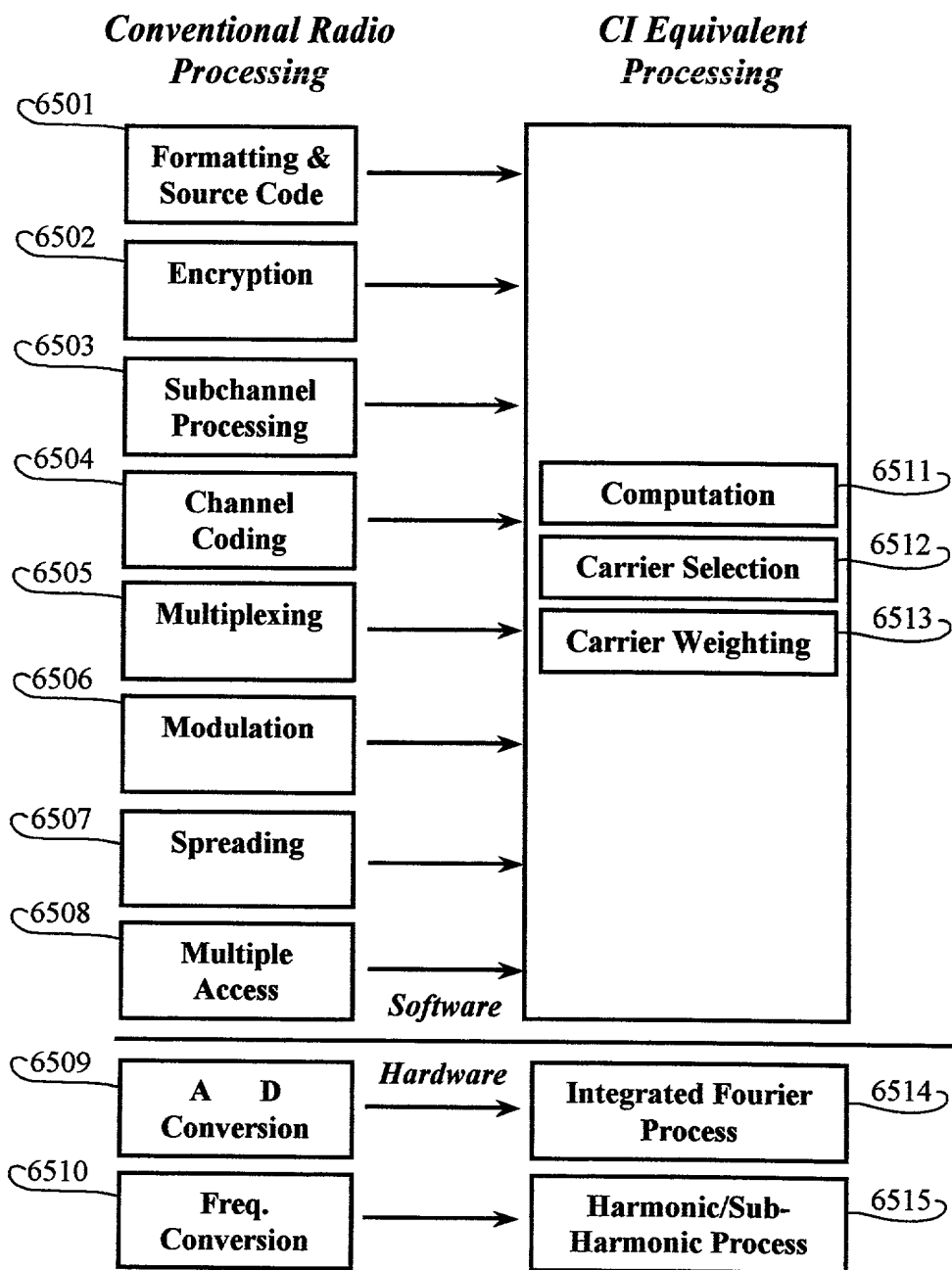


FIG. 65

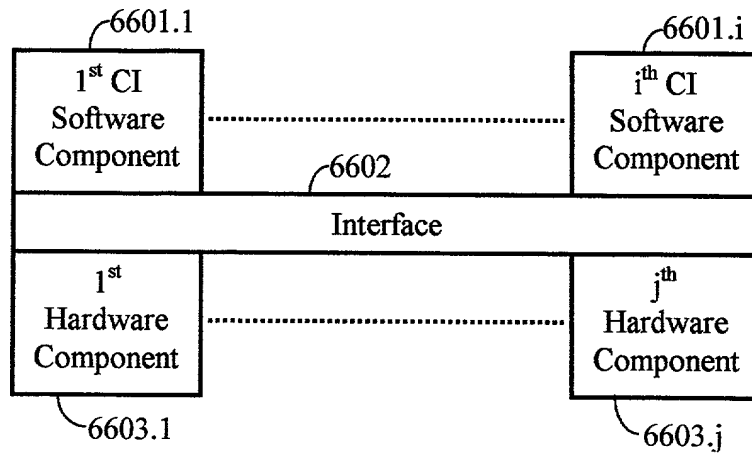


FIG. 66

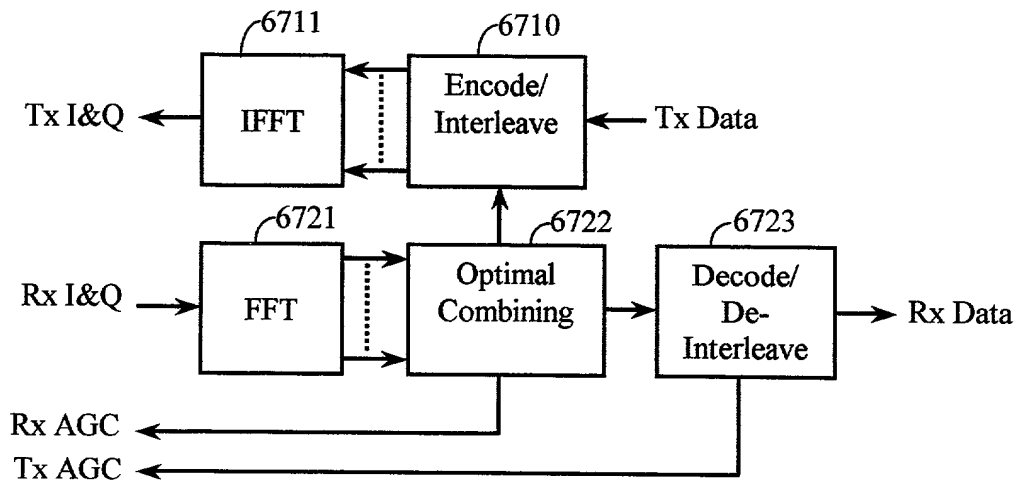


FIG. 67

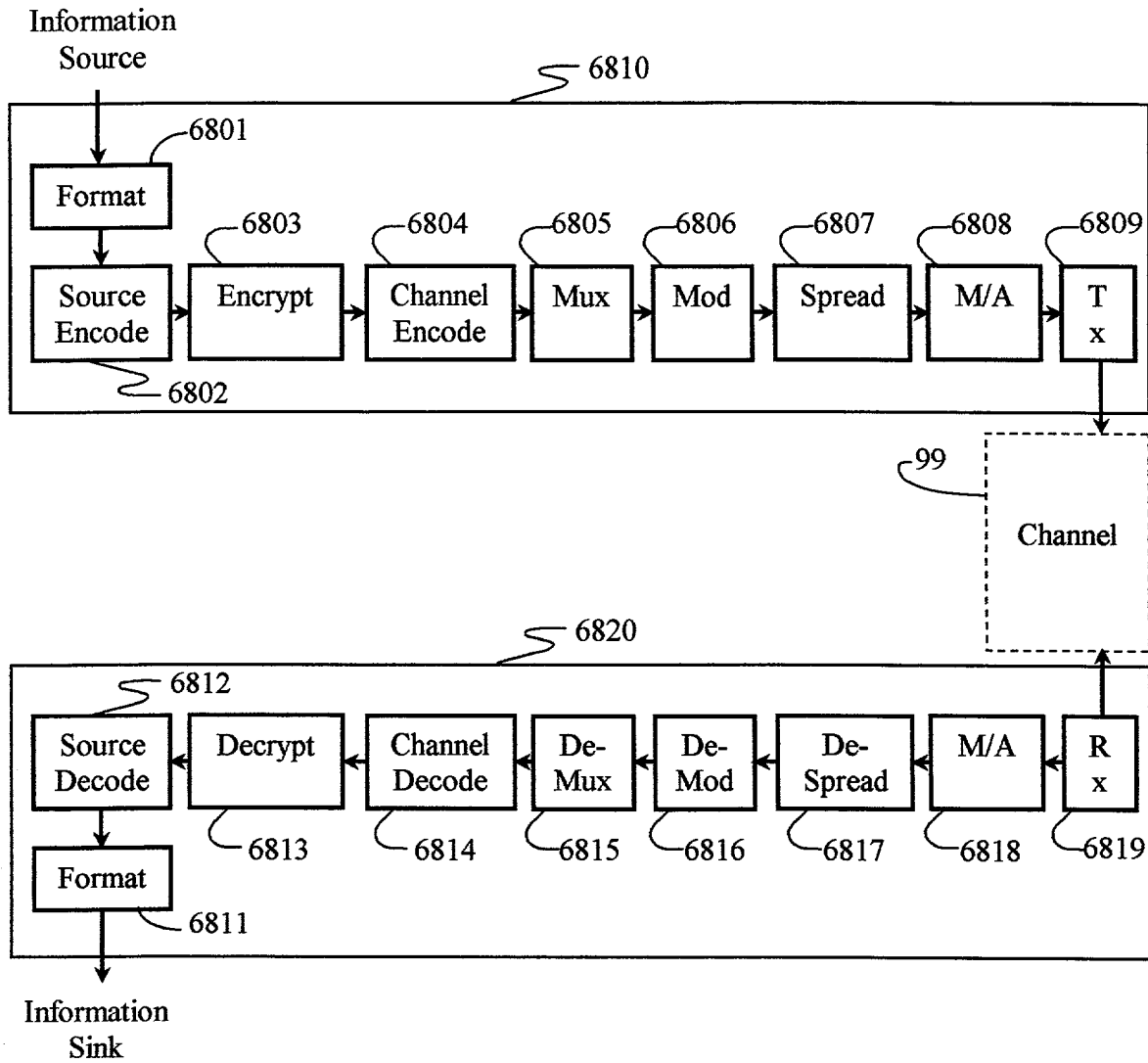


FIG. 68

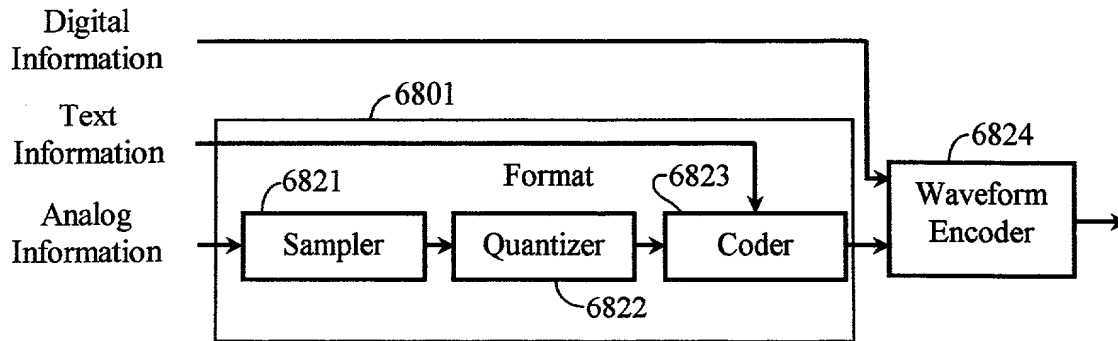


FIG. 69A

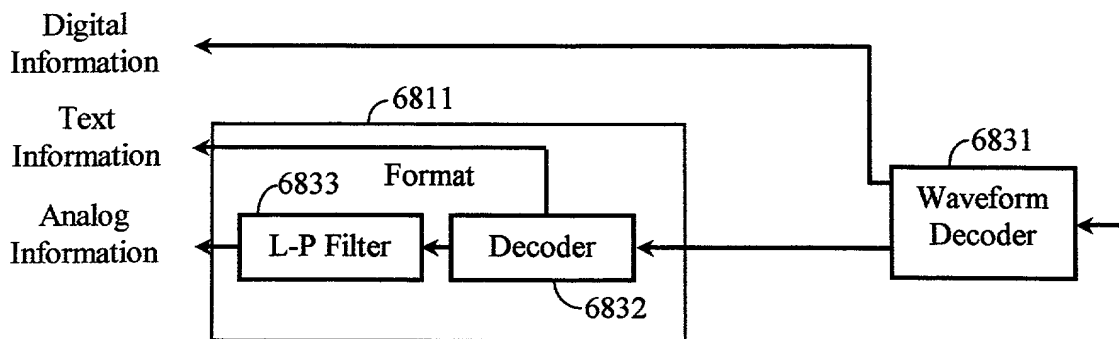


FIG. 69B

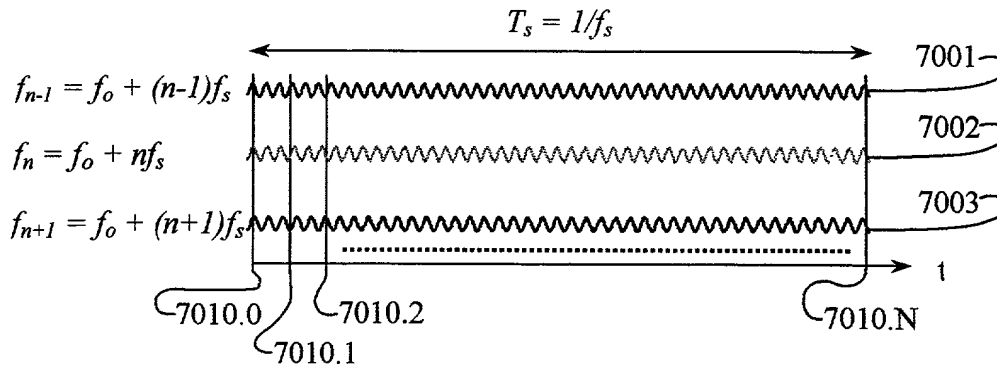


FIG. 70

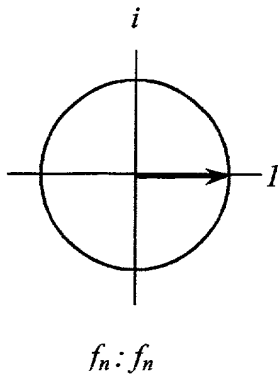


FIG. 71A

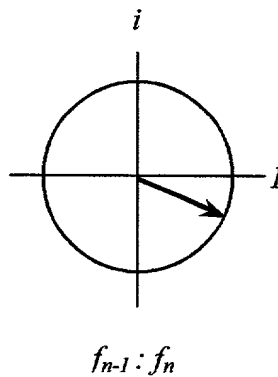


FIG. 71B

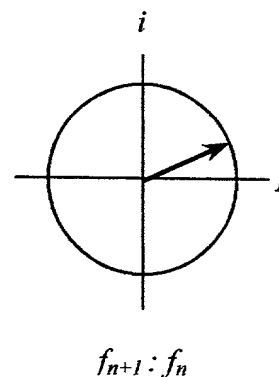


FIG. 71C

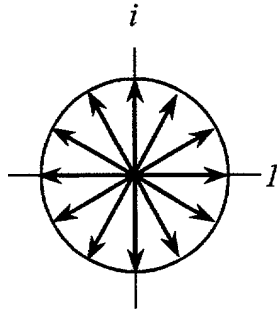


FIG. 72

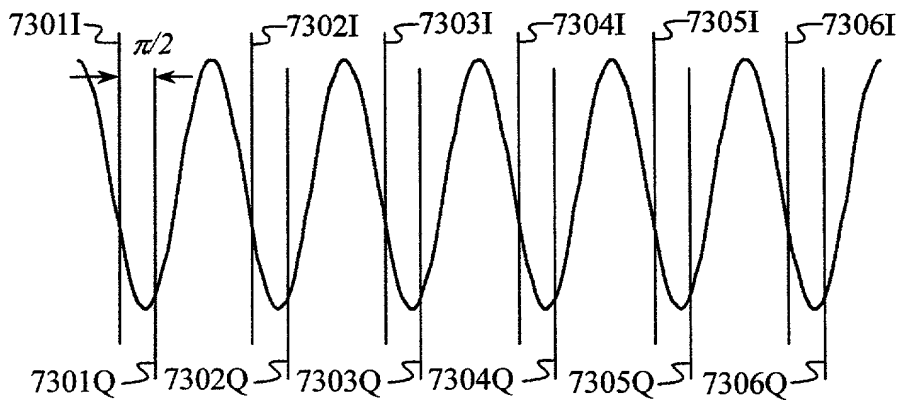


FIG. 73

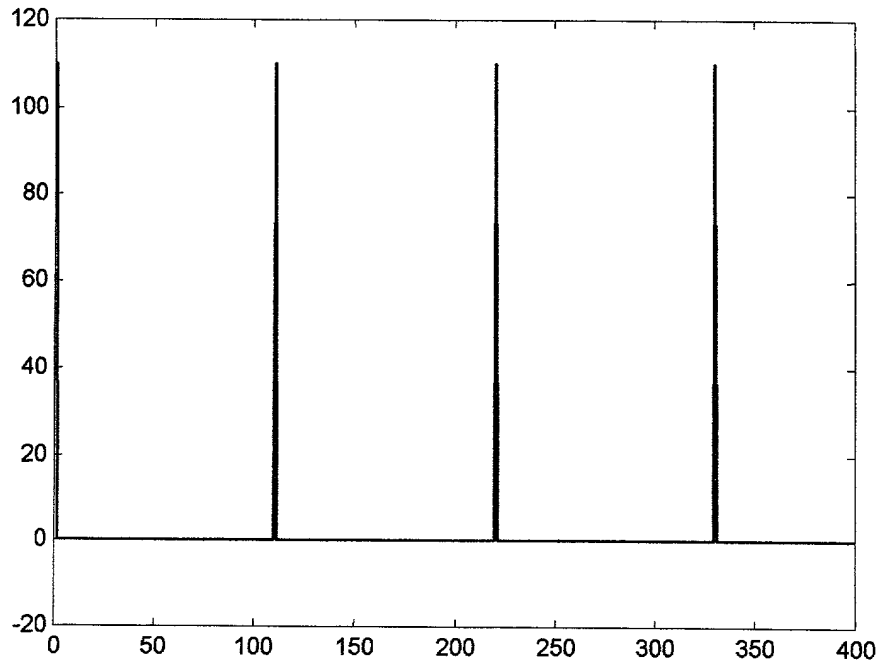


FIG. 74A

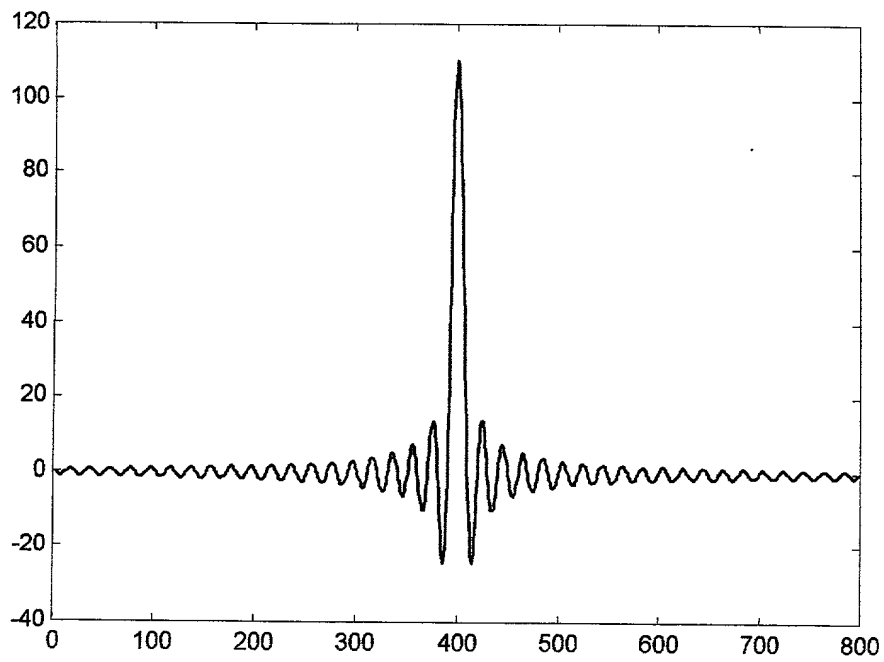


FIG. 74B

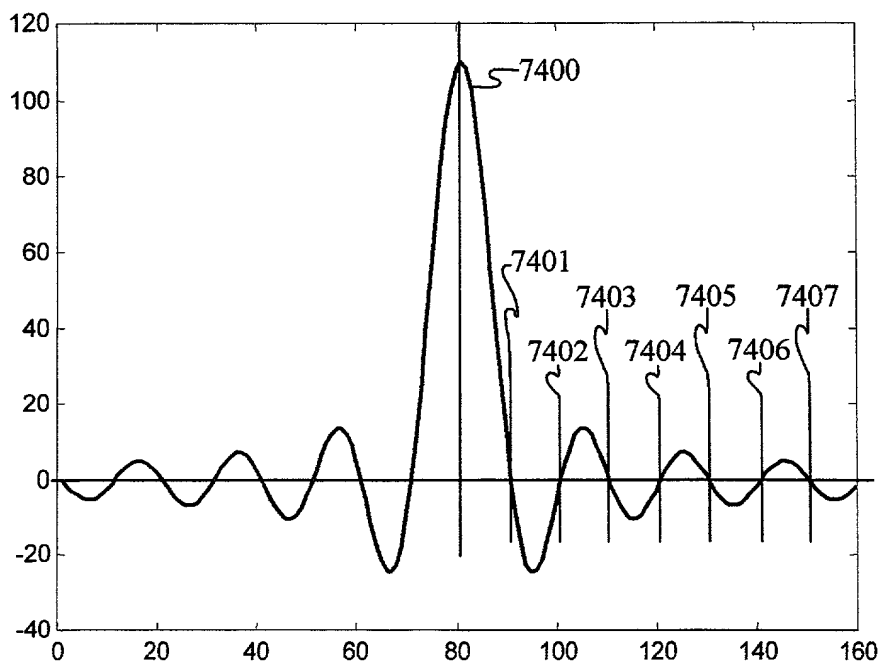


FIG. 74C

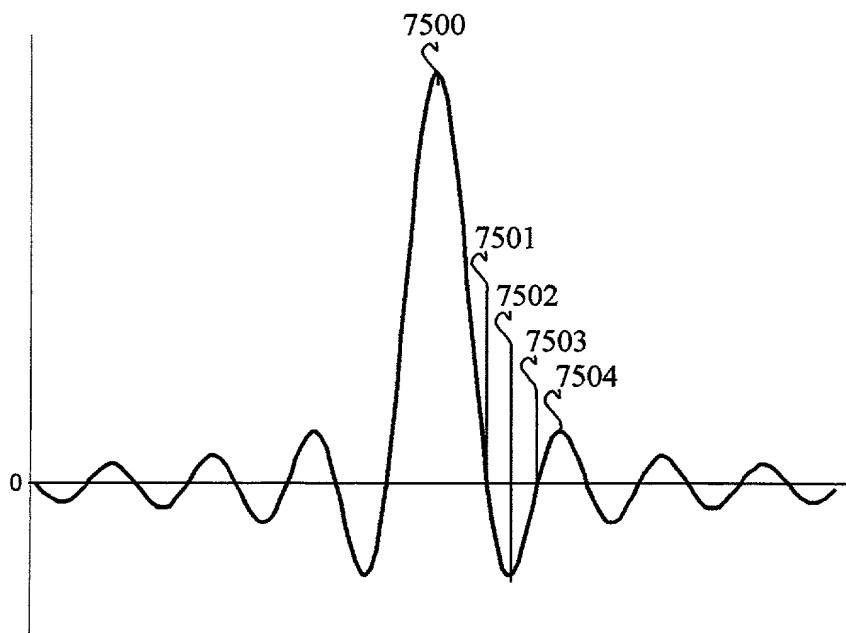


FIG. 75

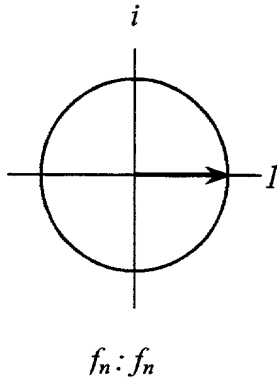


FIG. 76A

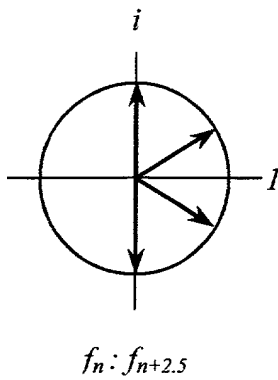


FIG. 76E

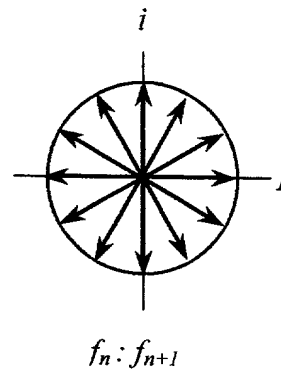


FIG. 76B

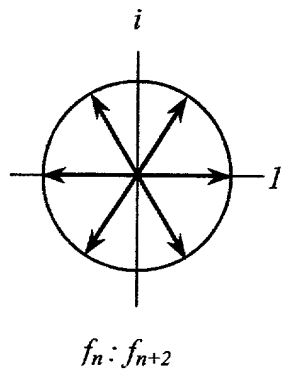


FIG. 76D

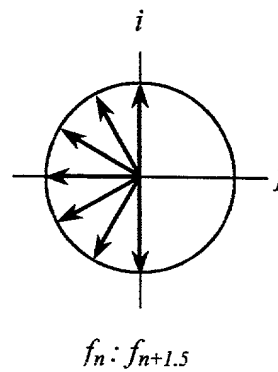


FIG. 76C

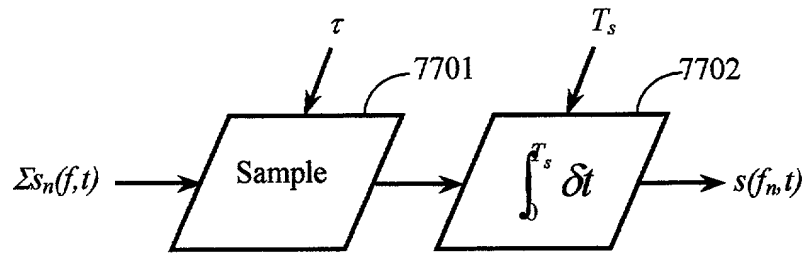


FIG. 77A

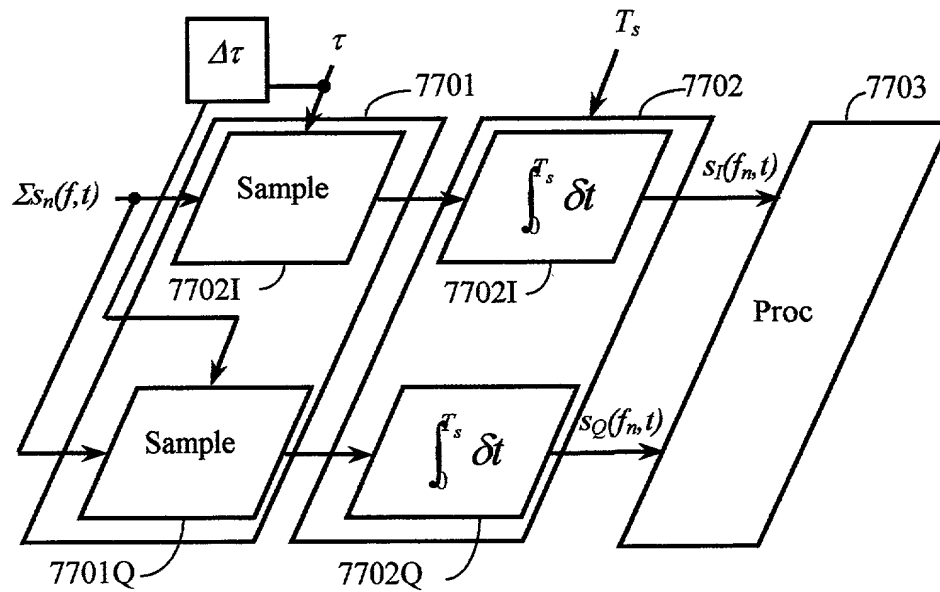


FIG. 77B

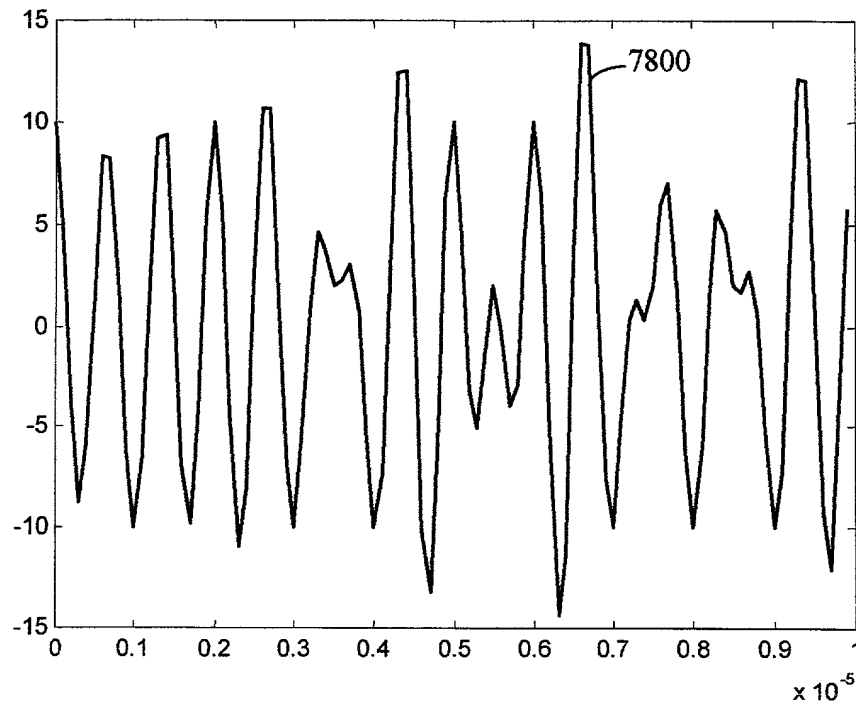


FIG. 78A

Phase Space	Tx Symbol	Rx Value
1	+1	+180.3291
2	-1	-167.5694
3	+1	+171.4620
4	-1	-137.1841
5	-1	-131.6329
6	+1	+134.0128
7	+1	+120.8614
8	-1	-116.9687
9	-1	-105.6389
10	-1	-169.7778

FIG. 78B

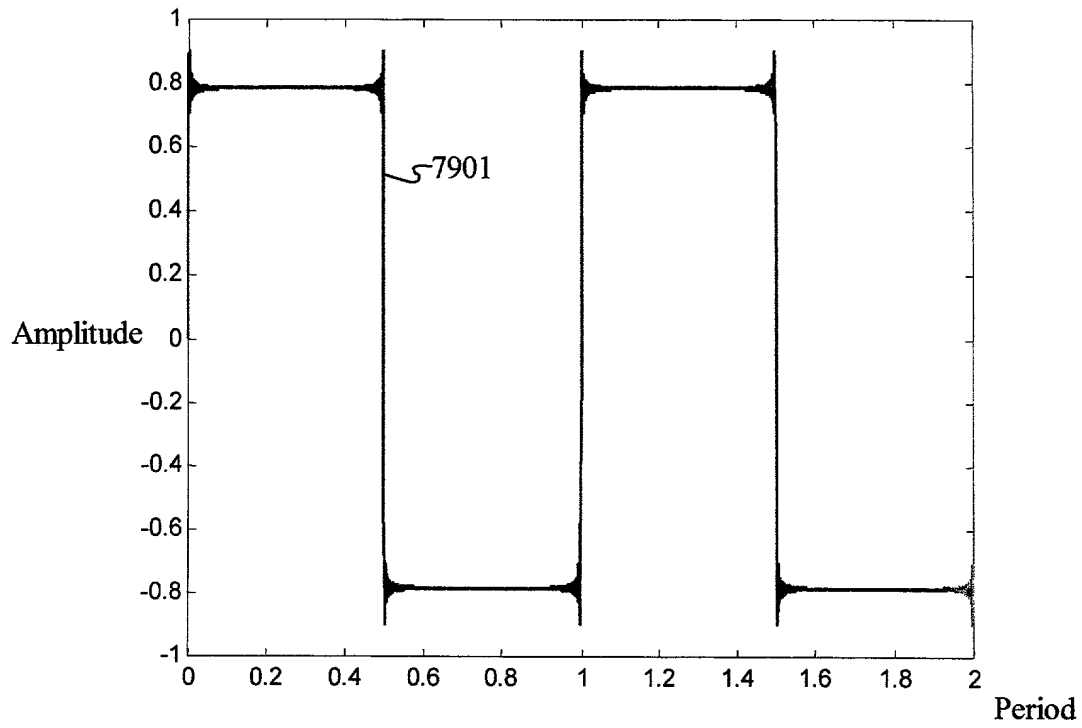


FIG. 79A

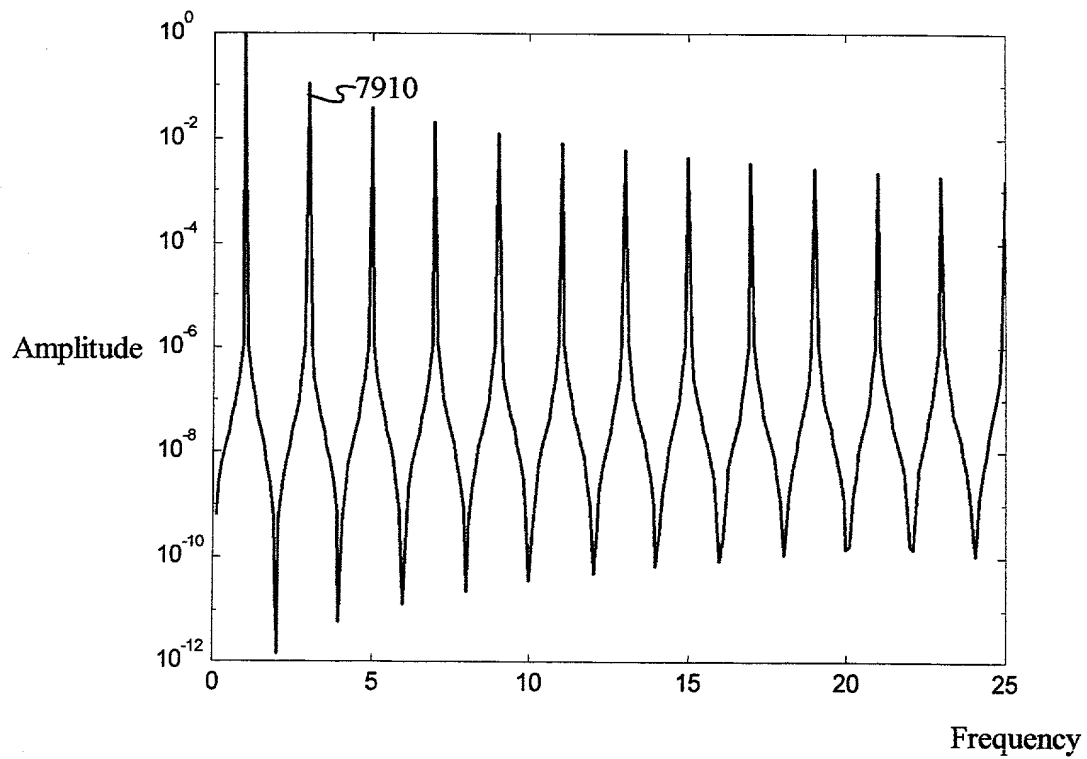


FIG. 79B

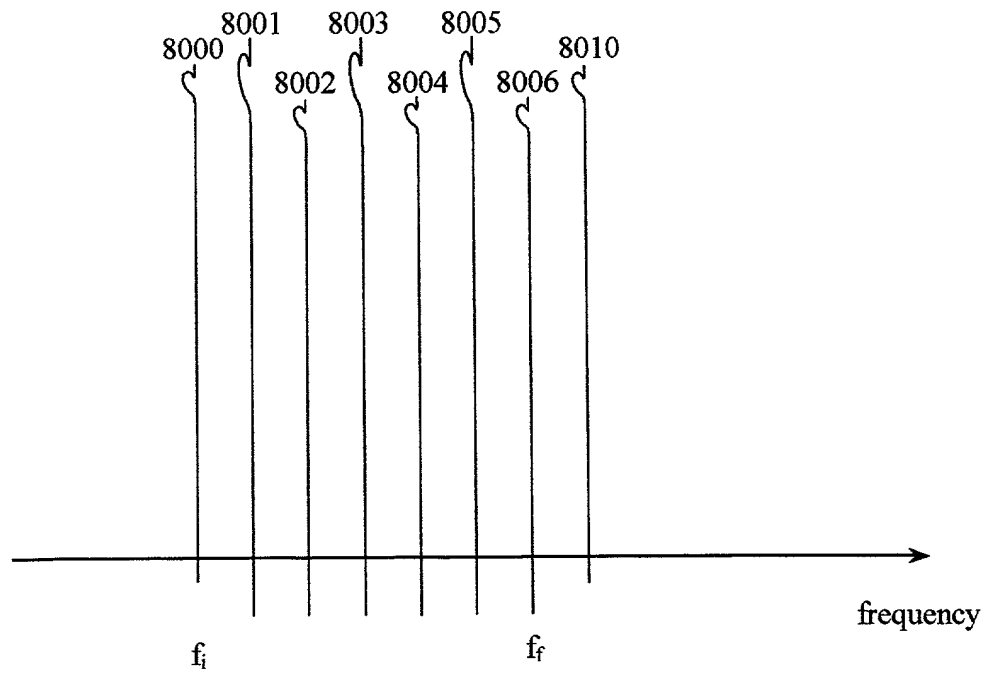


FIG. 80A

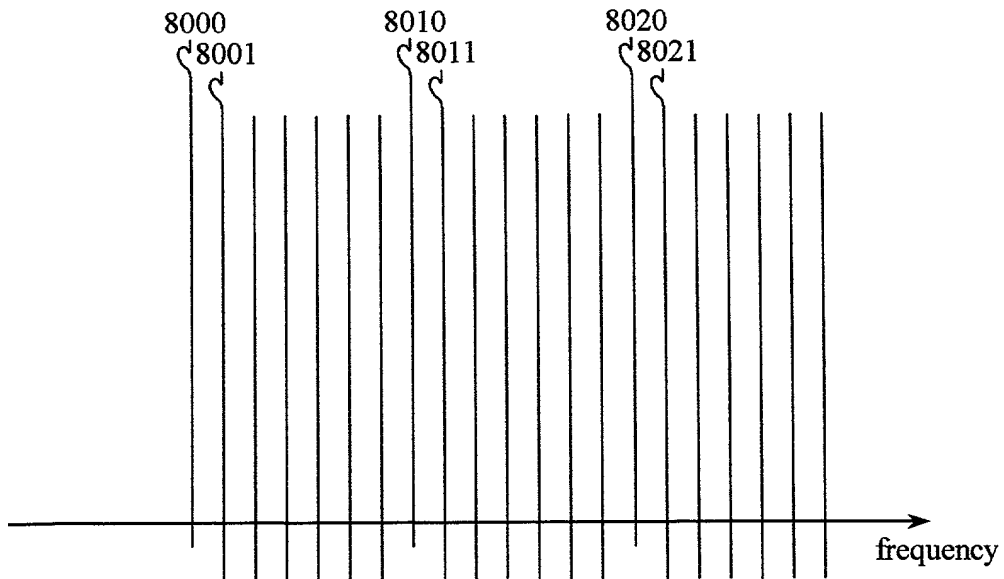


FIG. 80B

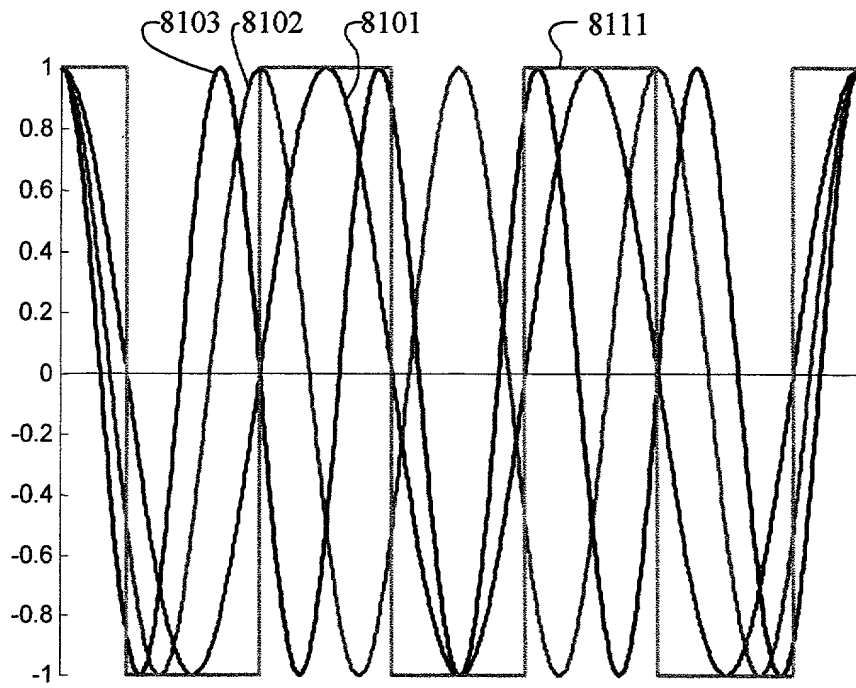


FIG. 81

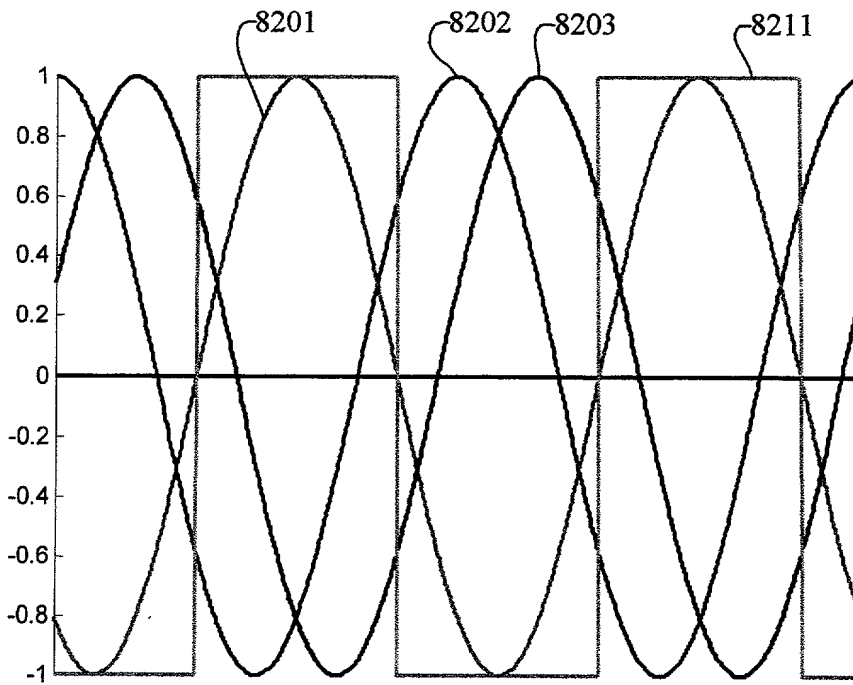


FIG. 82

Phase Space	Centered at PS 1	Centered at PS 2	Centered at PS 3
PS 1	1.9128e+003	3.0039	-3.9450
PS 2	-1.8043	1.9117e+003	4.8284
PS 3	1.6598	-2.0786	1.9117e+003

FIG. 83

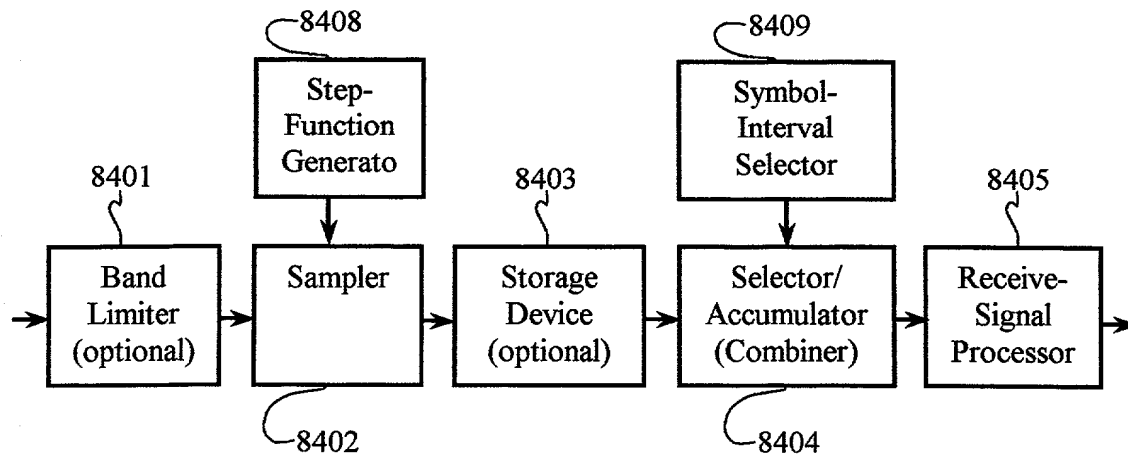


FIG. 84

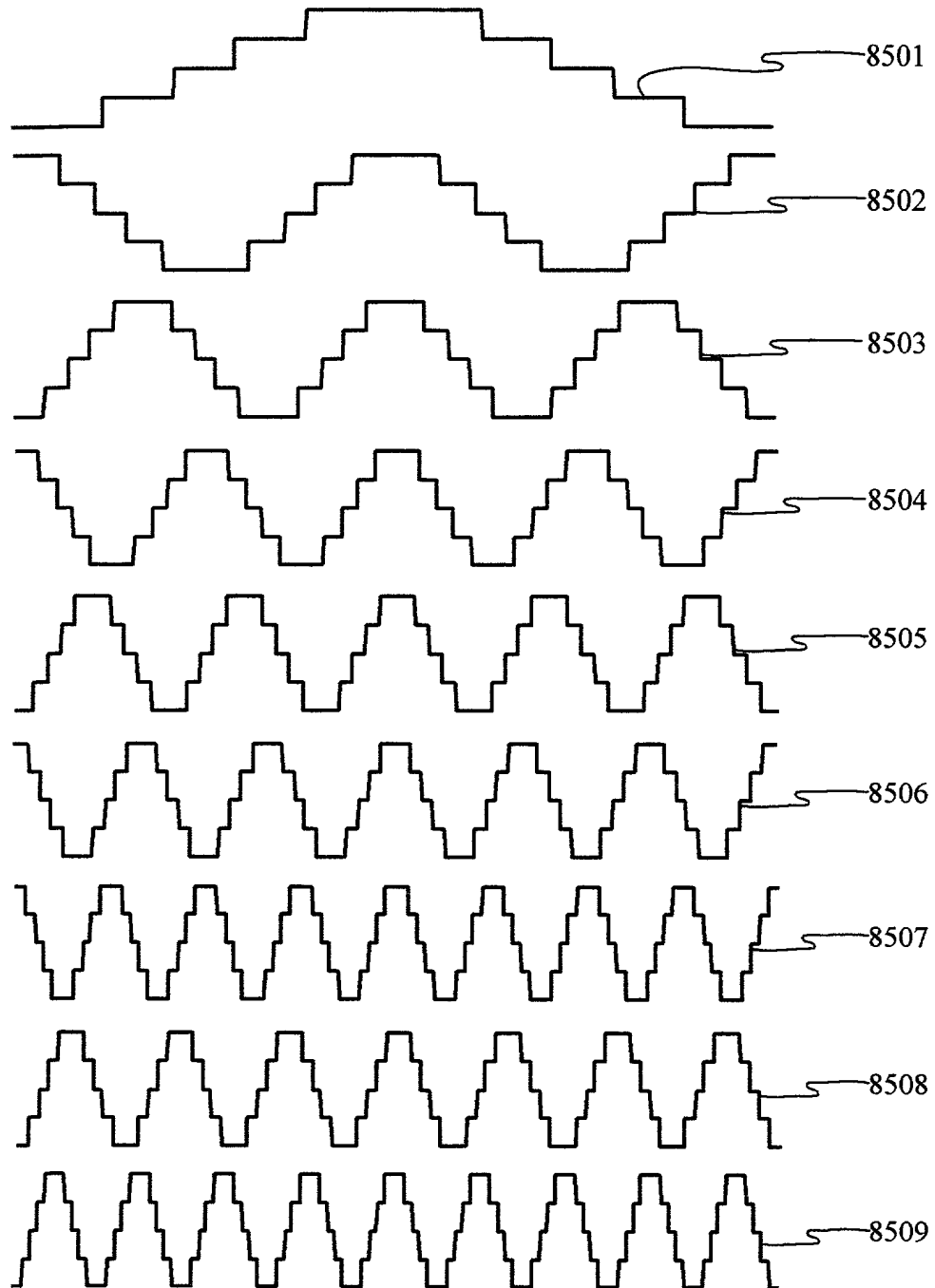


FIG. 85

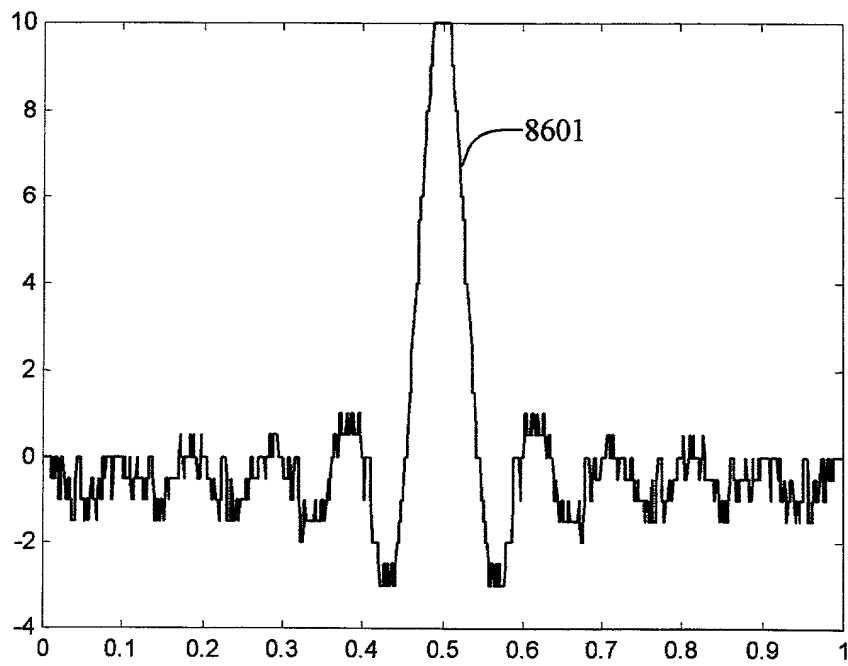


FIG. 86A

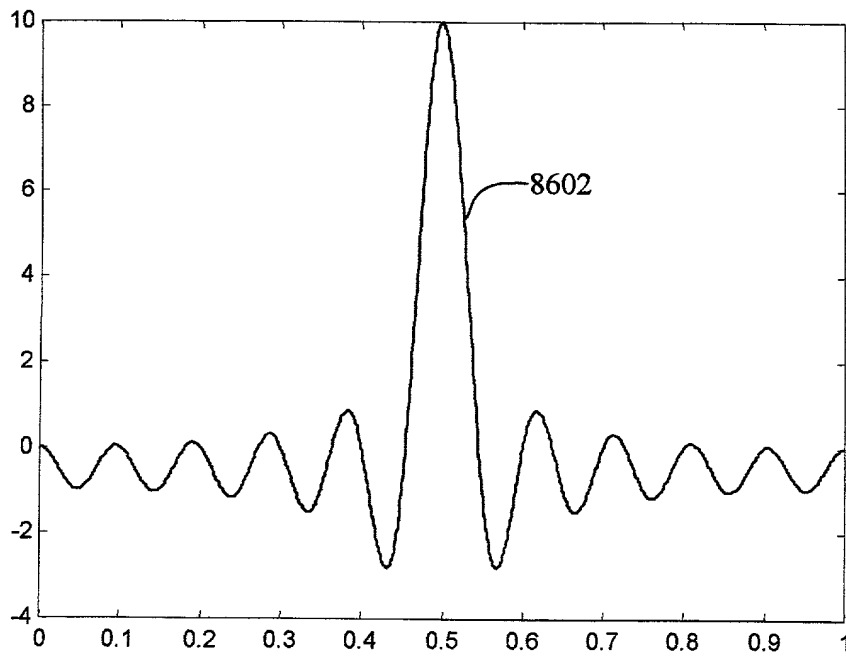


FIG. 86B

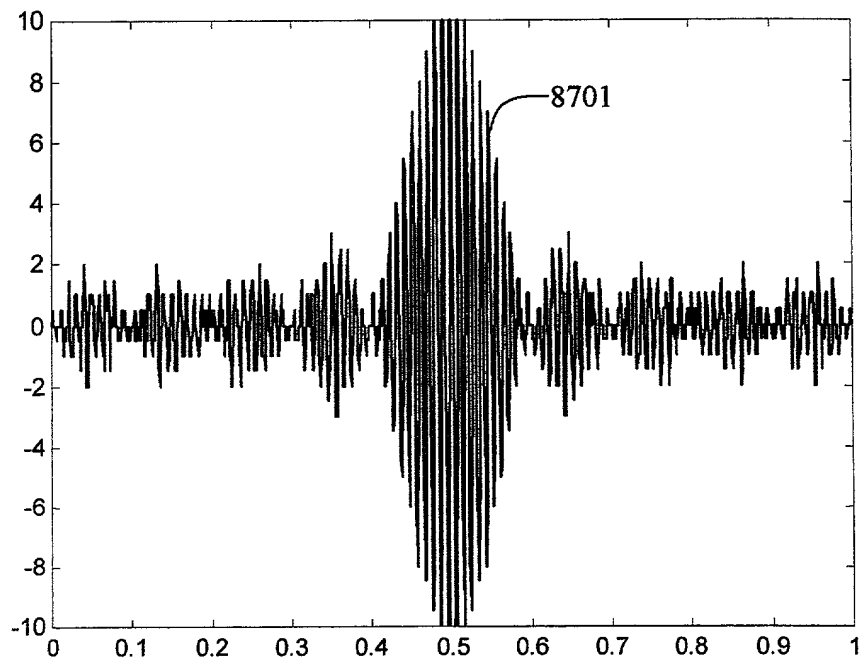


FIG. 87A

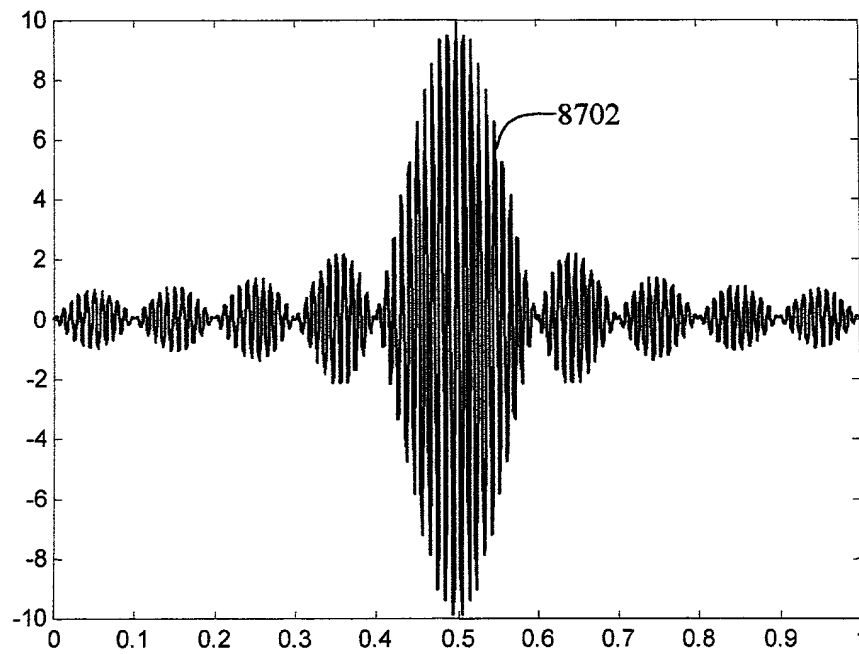


FIG. 87B

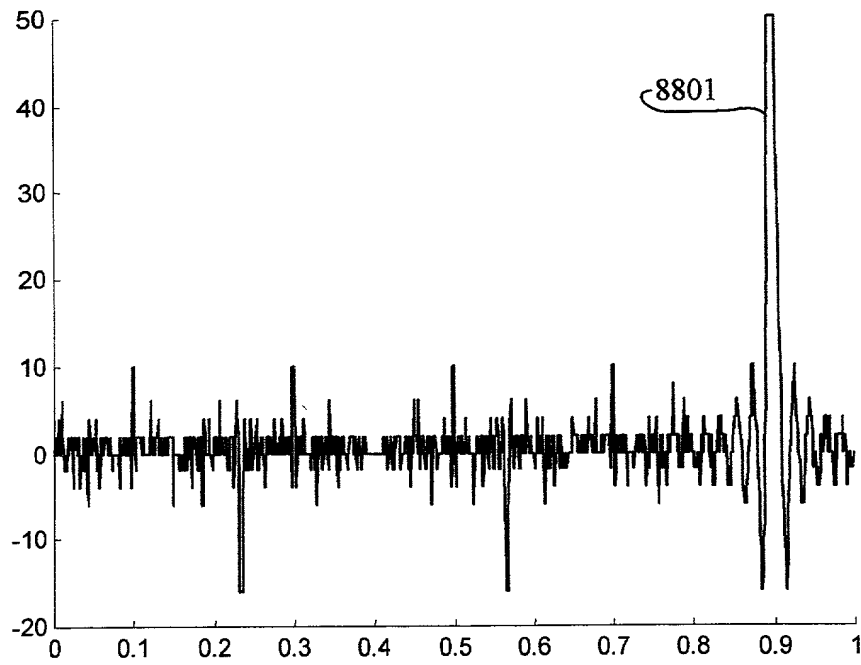


FIG. 88A

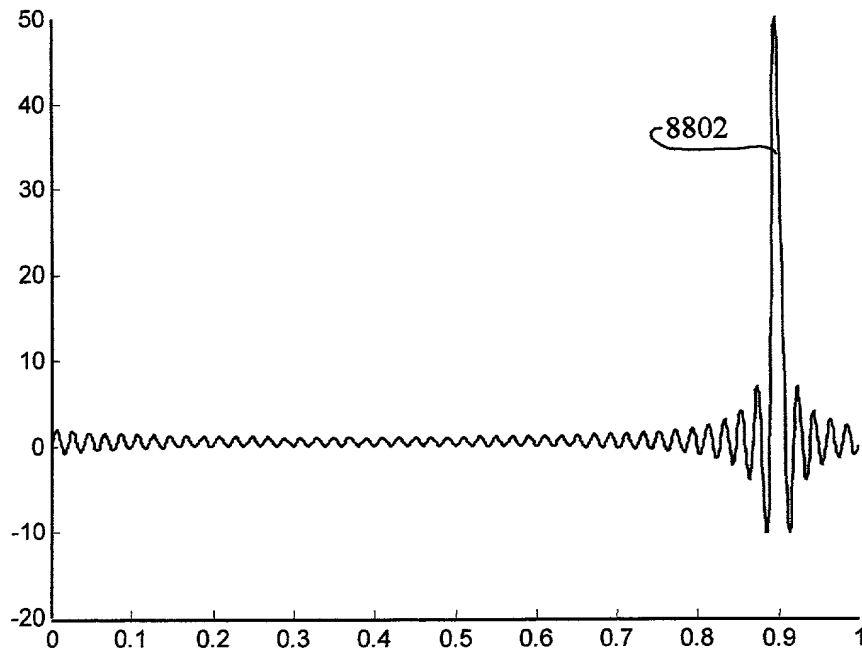


FIG. 88B

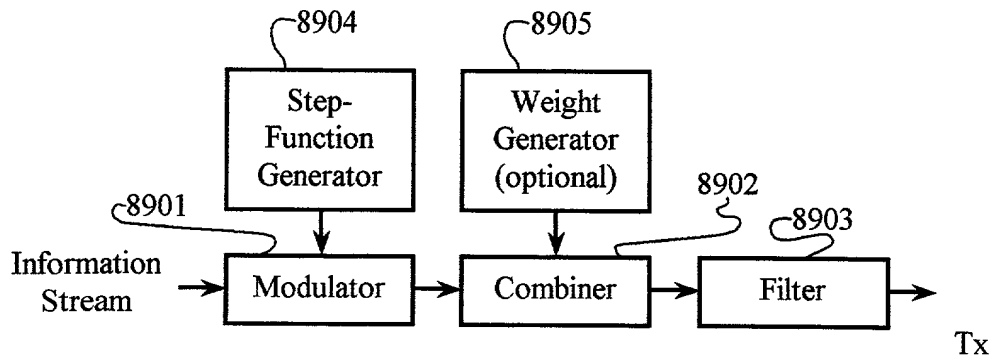


FIG. 89A

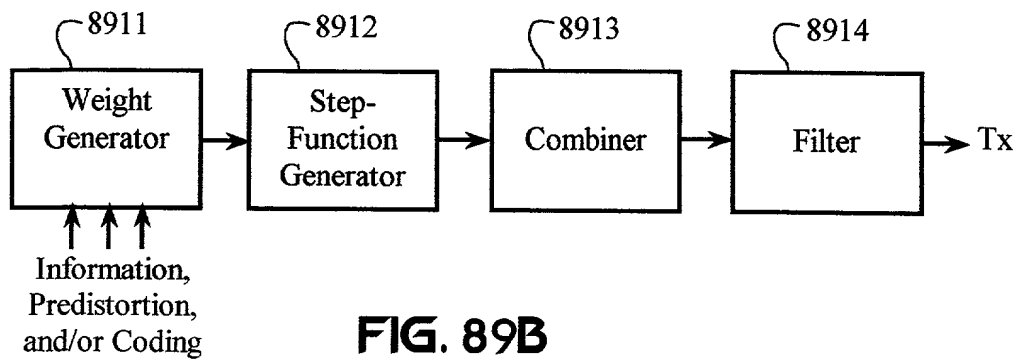


FIG. 89B

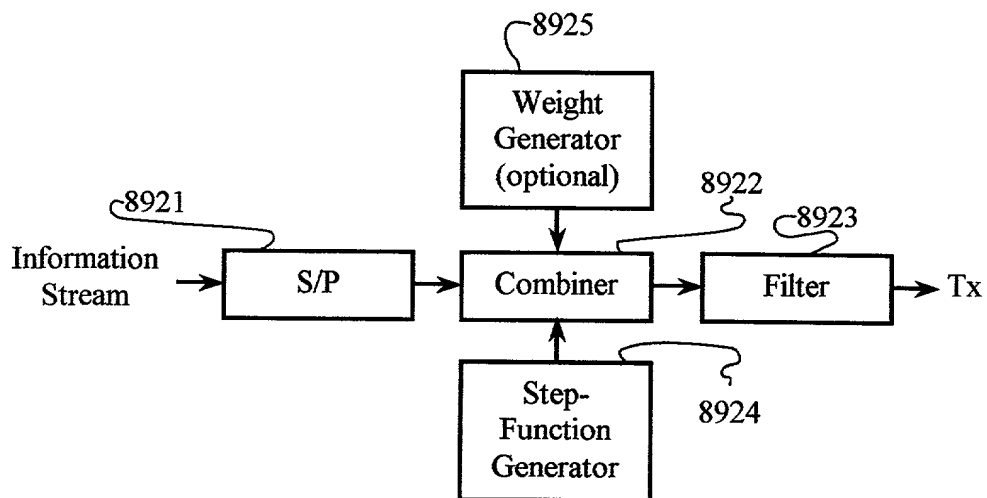


FIG. 89C

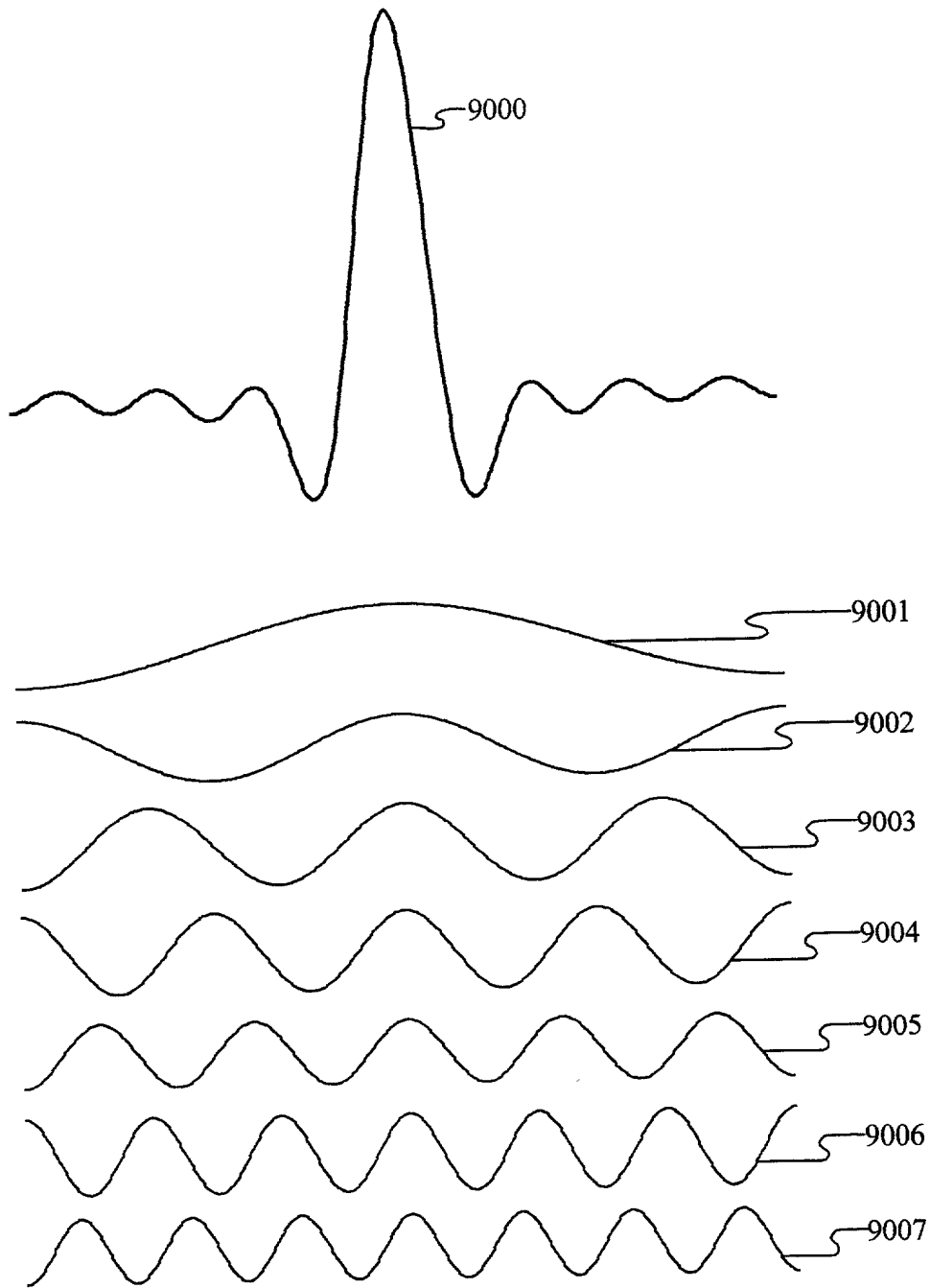


FIG. 90

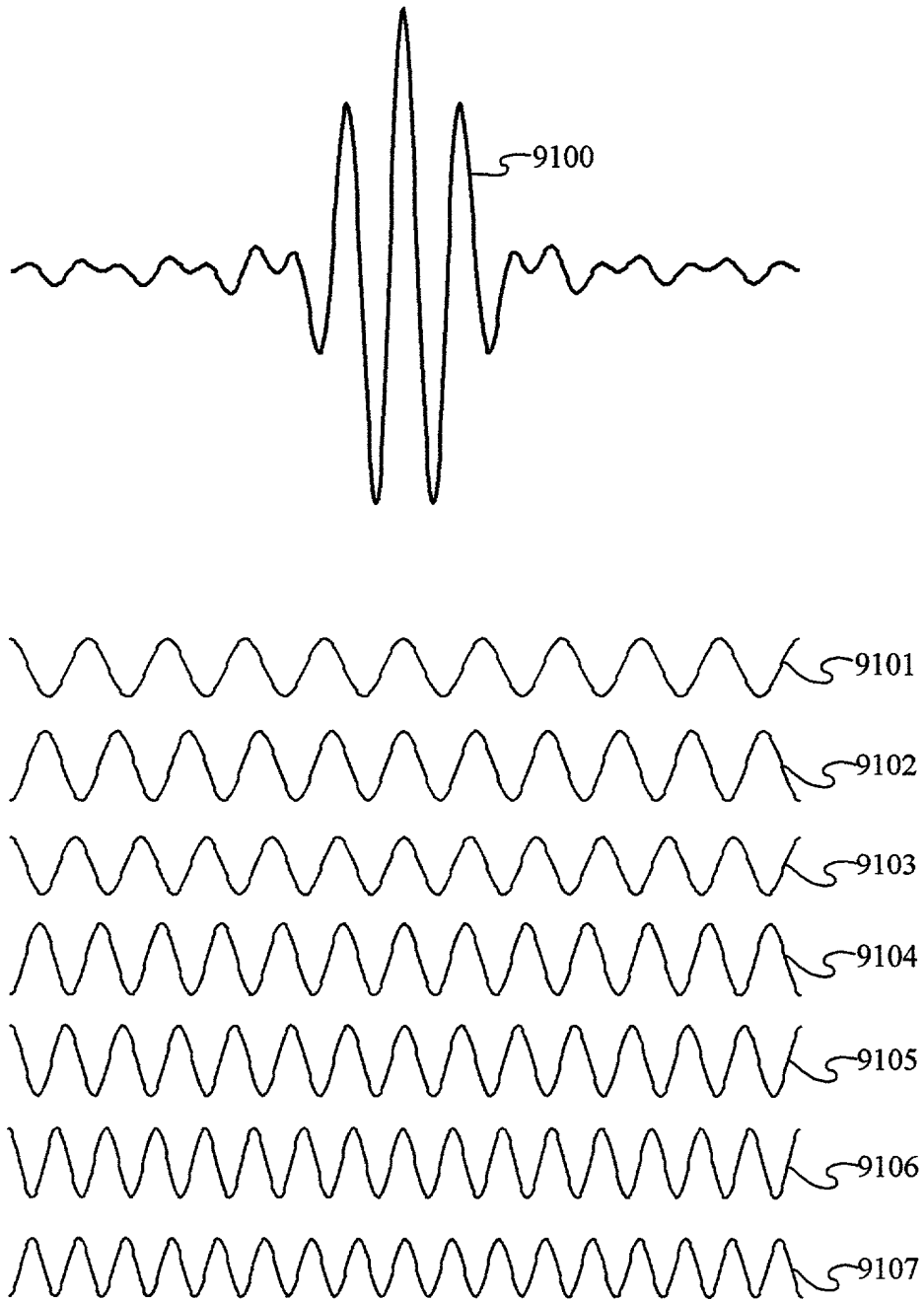


FIG. 91

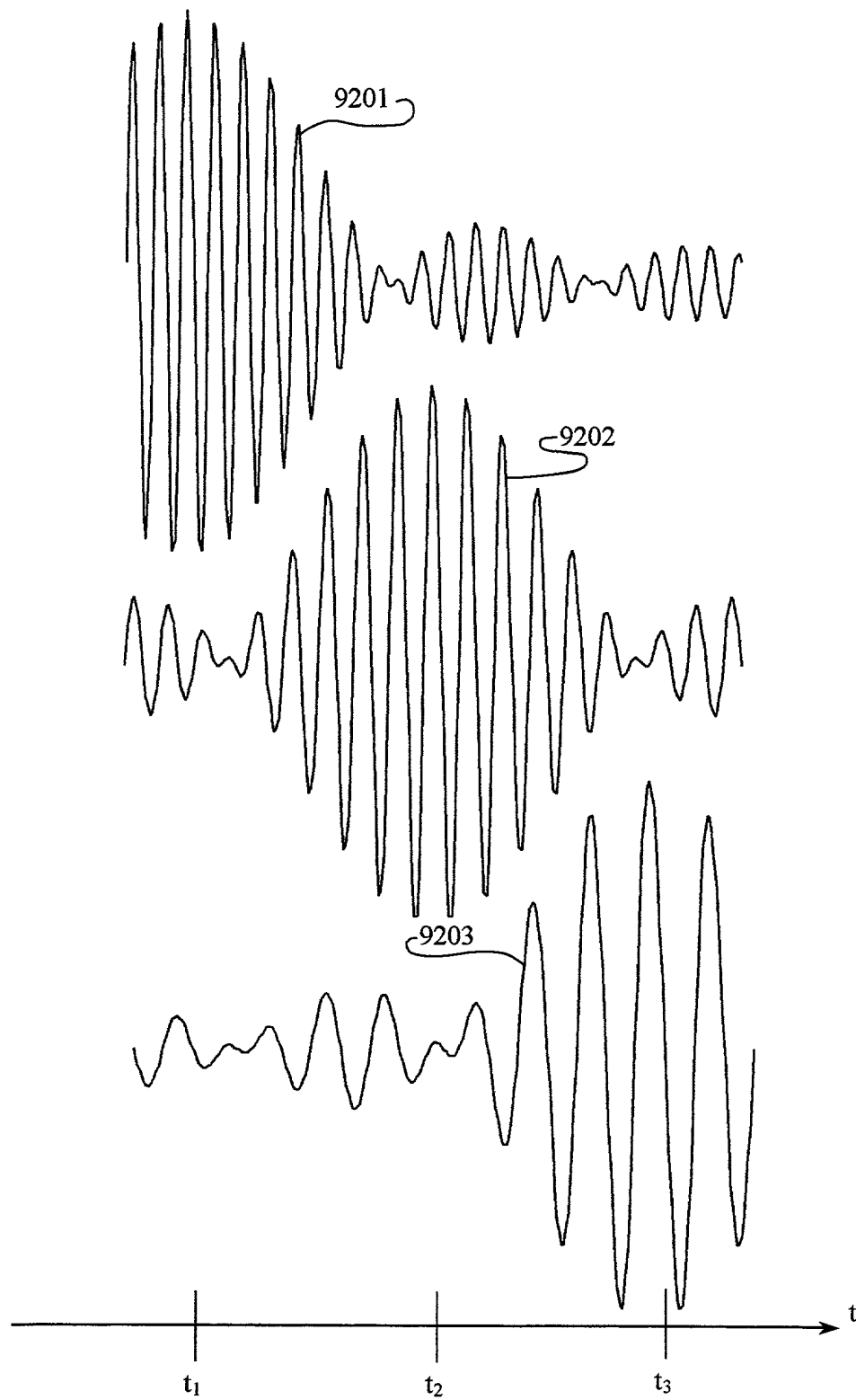


FIG. 92A

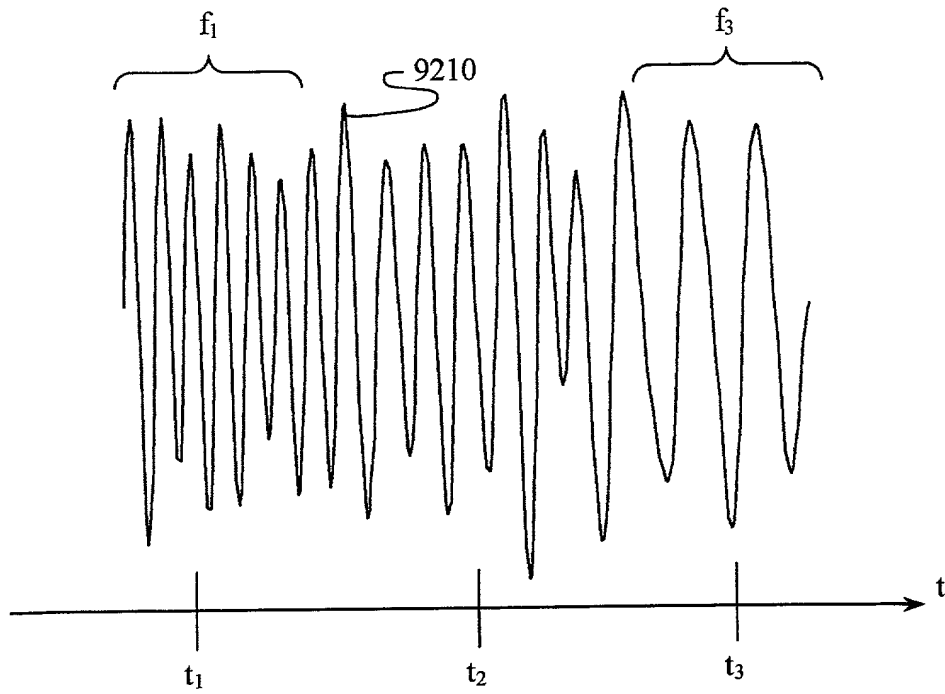


FIG. 92B

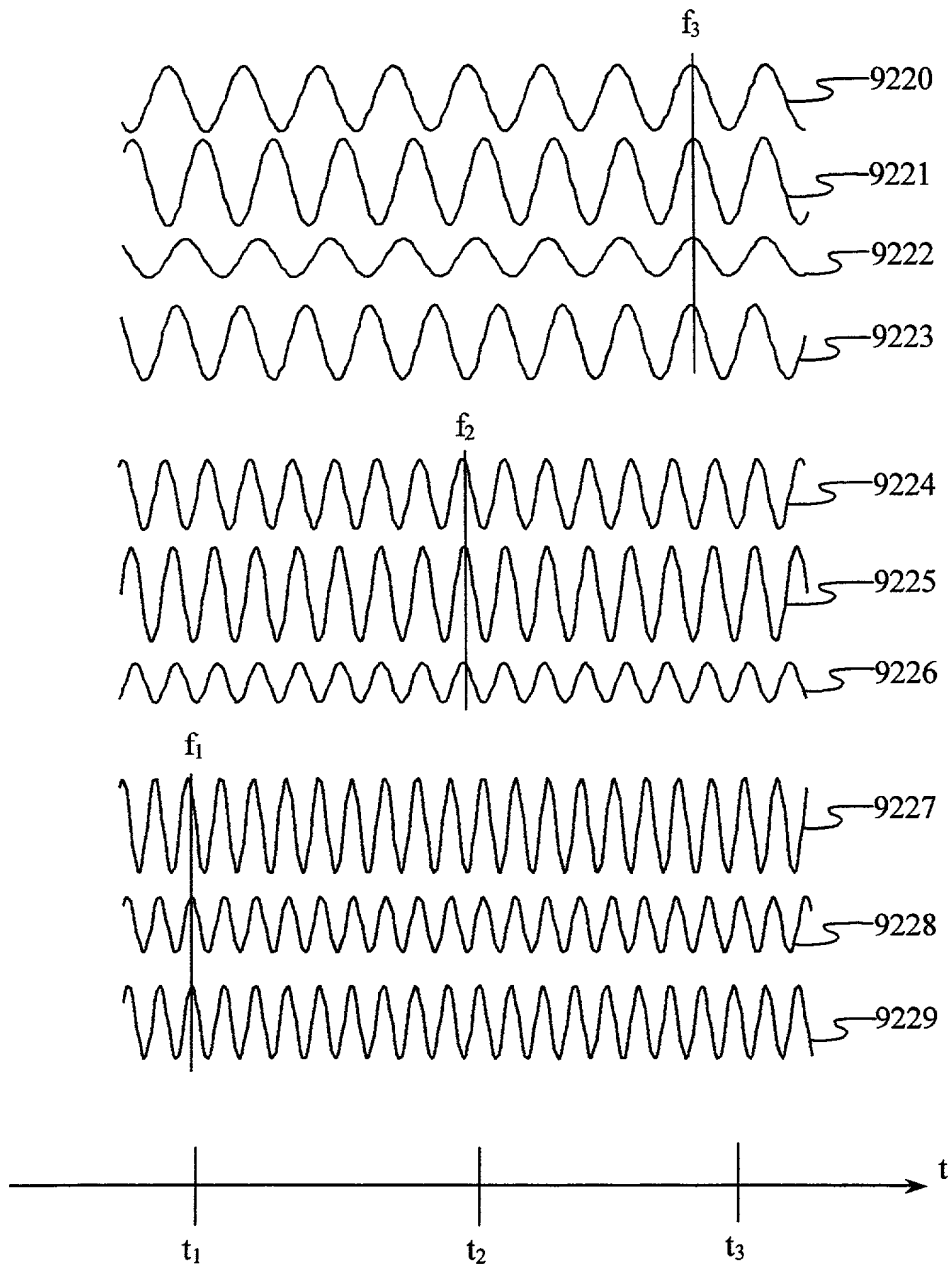
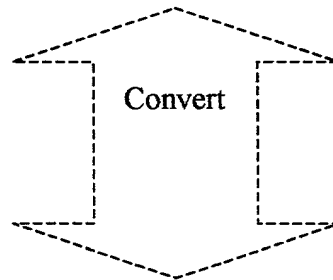
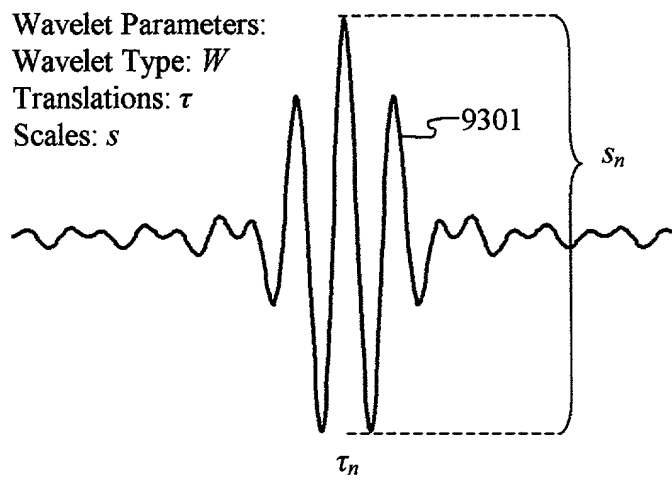


FIG. 92C



Frequency-Domain CI
Waveform Parameters:
Carrier Frequencies f_n
Carrier Weights: w_n

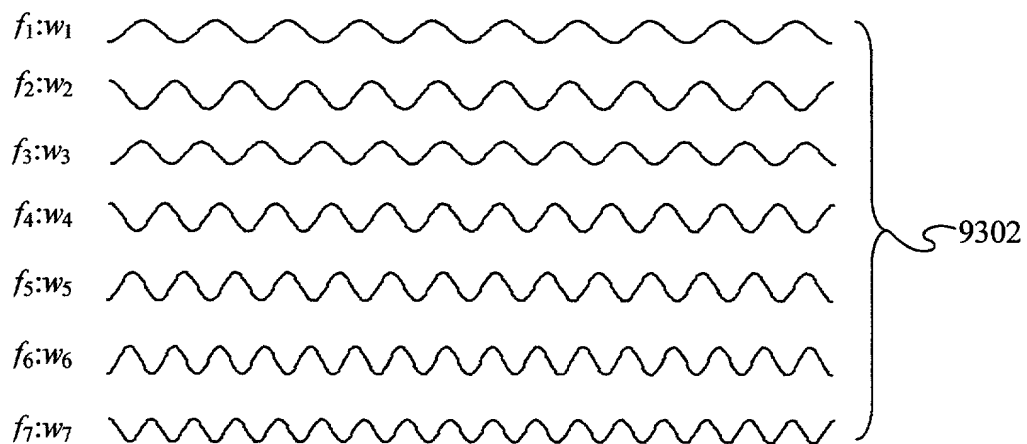


FIG. 93

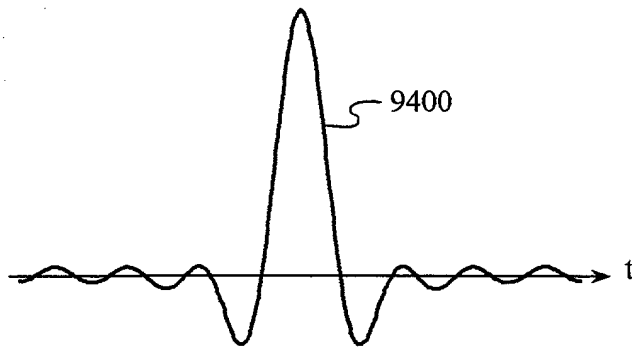


FIG. 94A

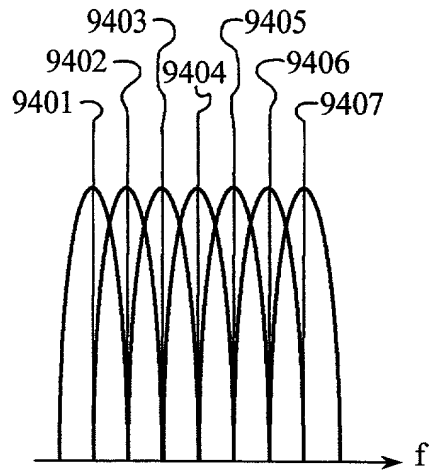


FIG. 94C

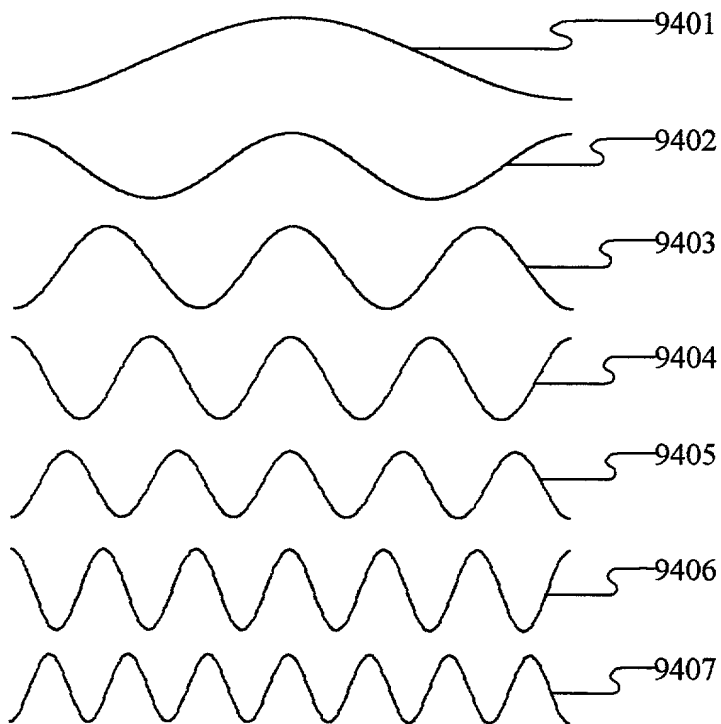


FIG. 94B

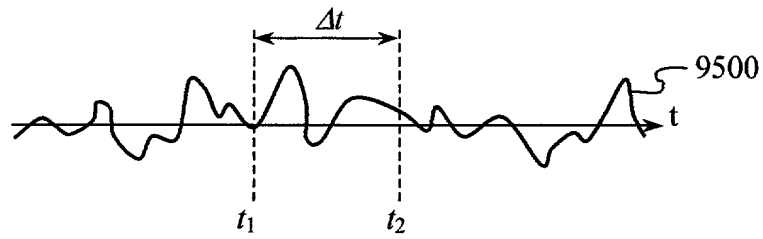


FIG. 95A

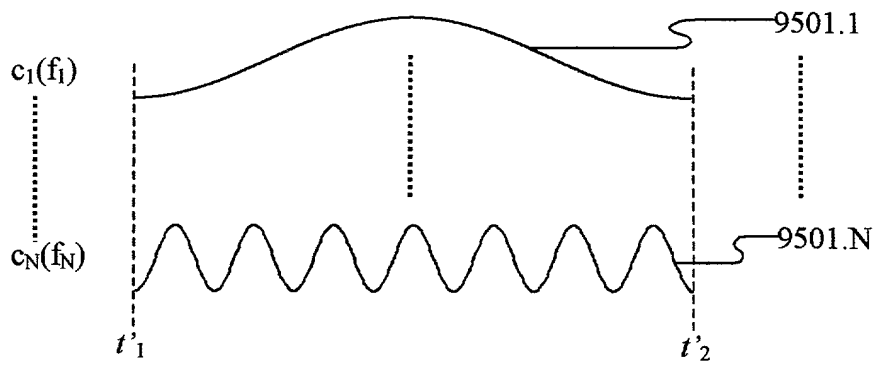


FIG. 95B

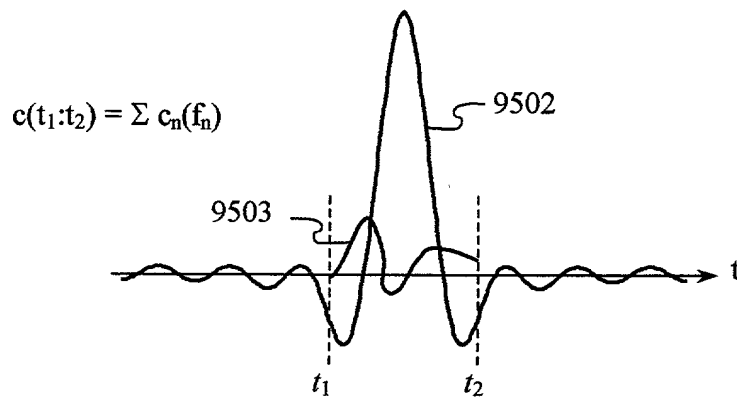


FIG. 95C

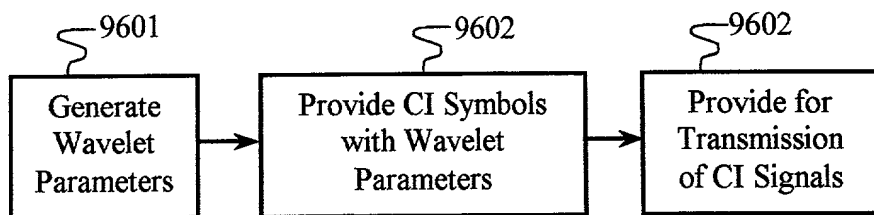


FIG. 96A

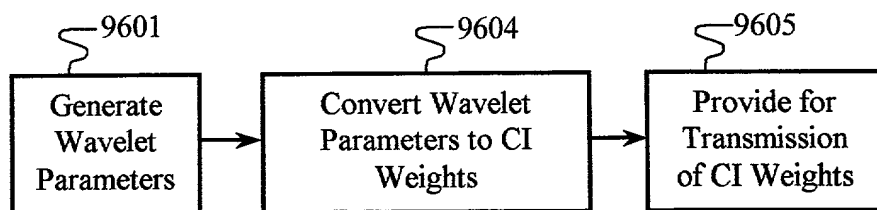


FIG. 96B

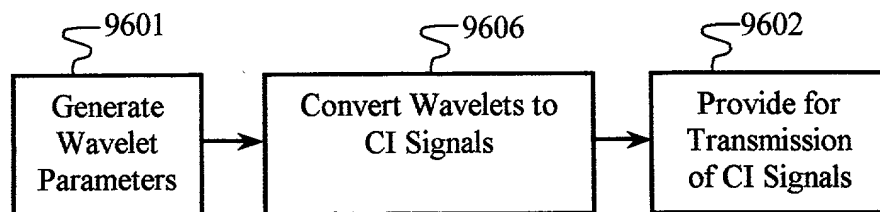


FIG. 96C

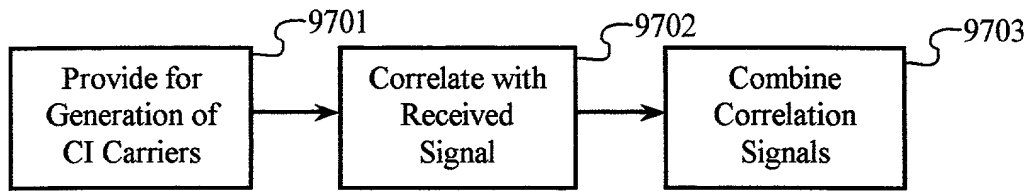


FIG. 97A

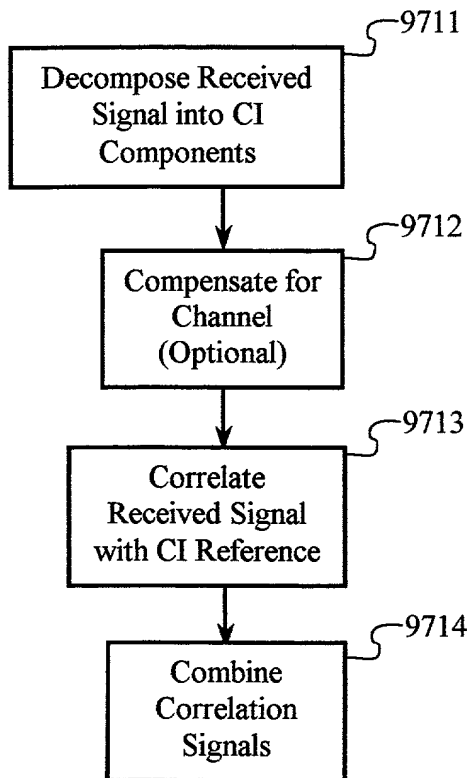


FIG. 97B

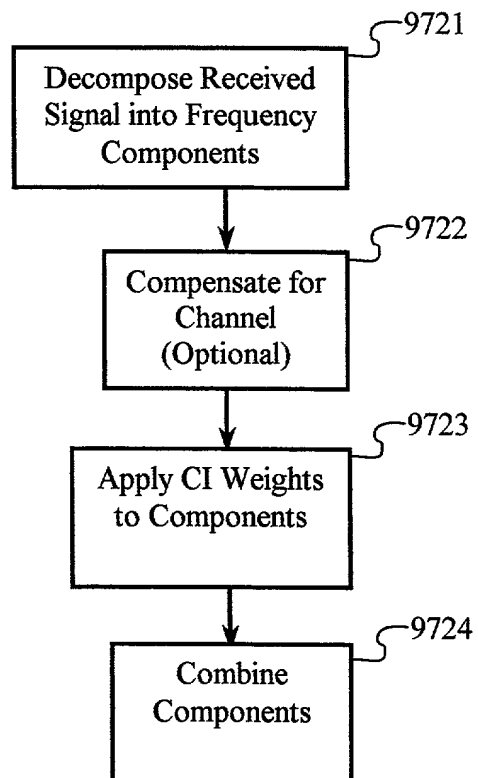


FIG. 97C

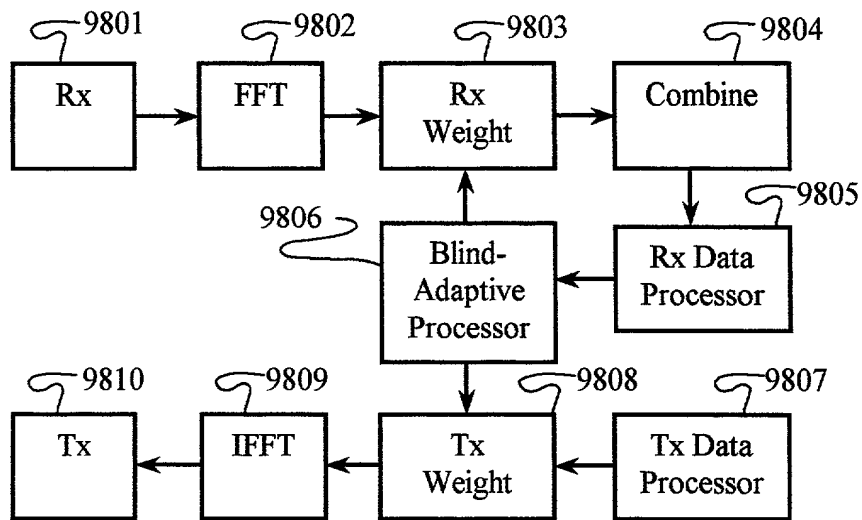


FIG. 98

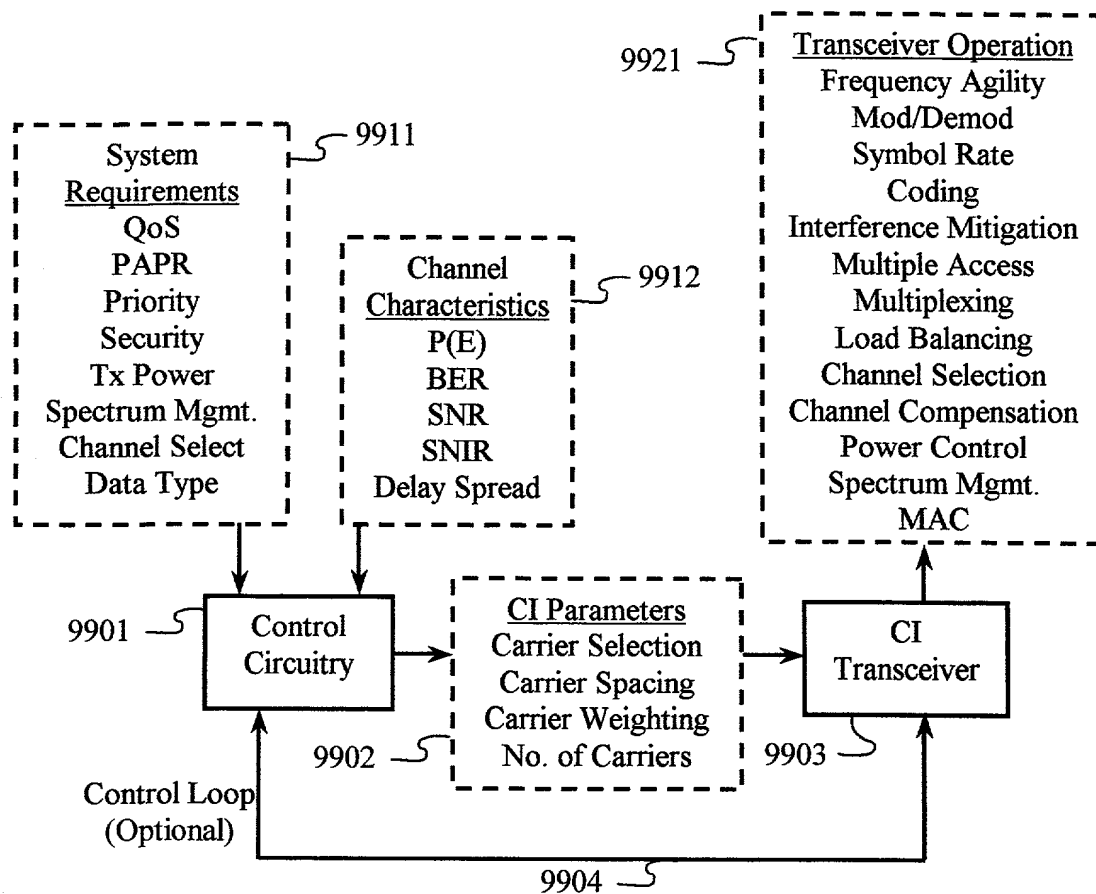


FIG. 99

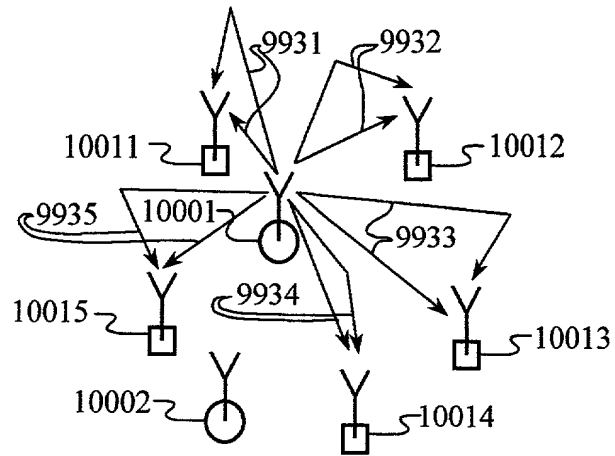


FIG. 100A

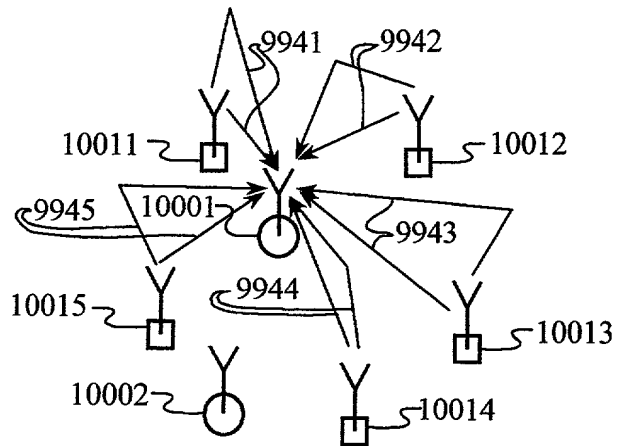


FIG. 100B

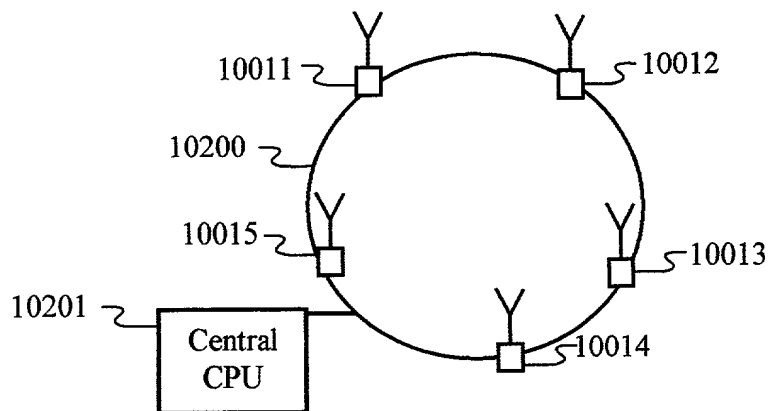


FIG. 101

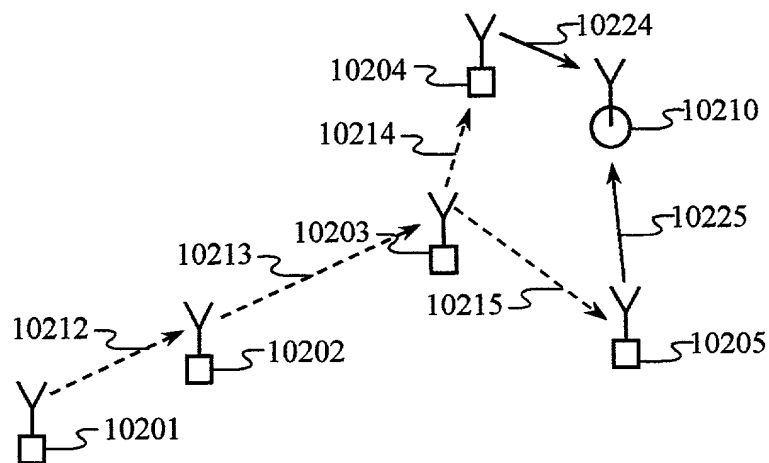


FIG. 102

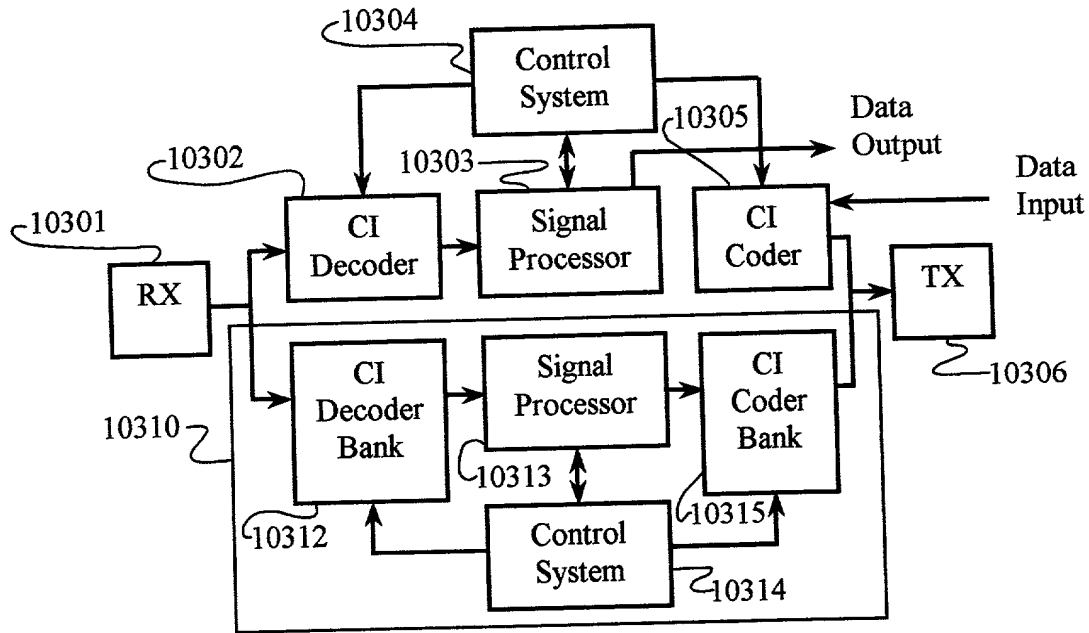


FIG. 103A

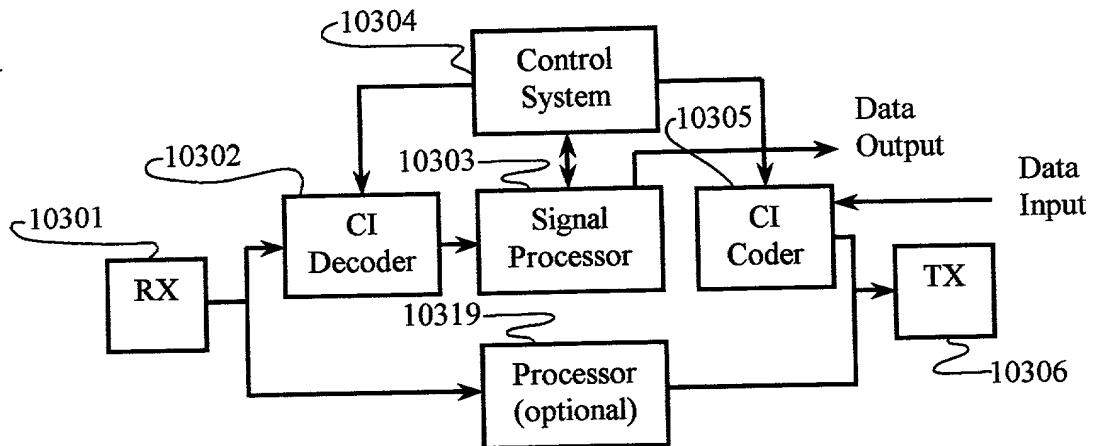


FIG. 103B

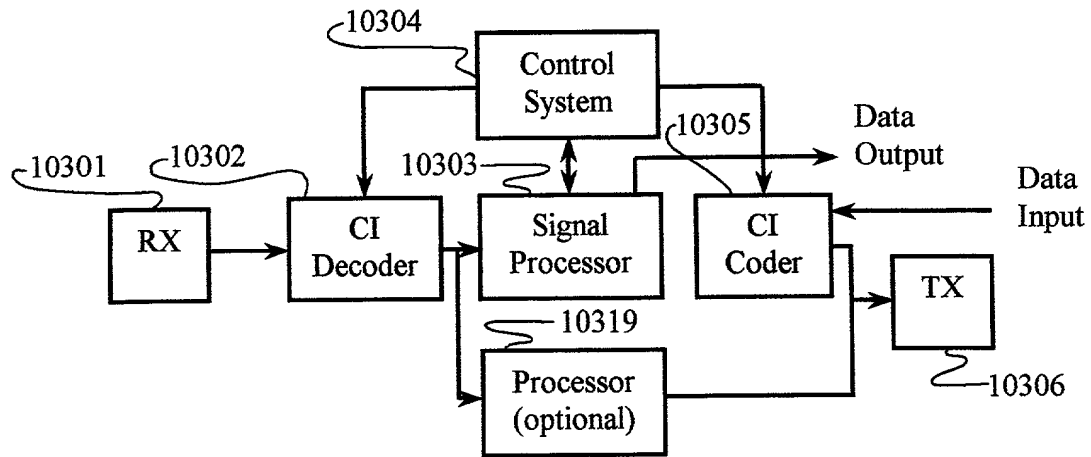


FIG. 103C

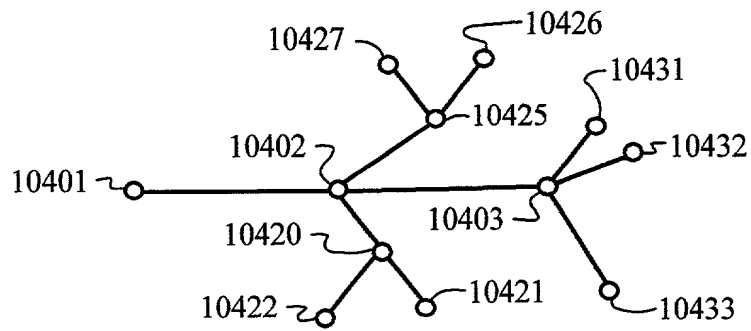


FIG. 104A

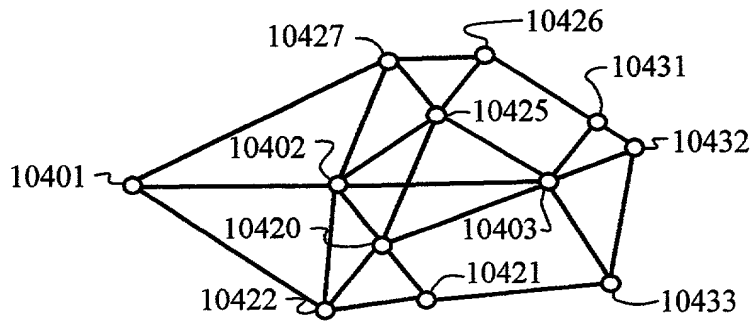


FIG. 104B

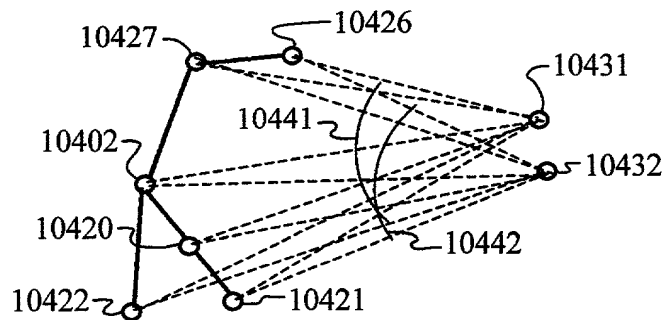


FIG. 104C

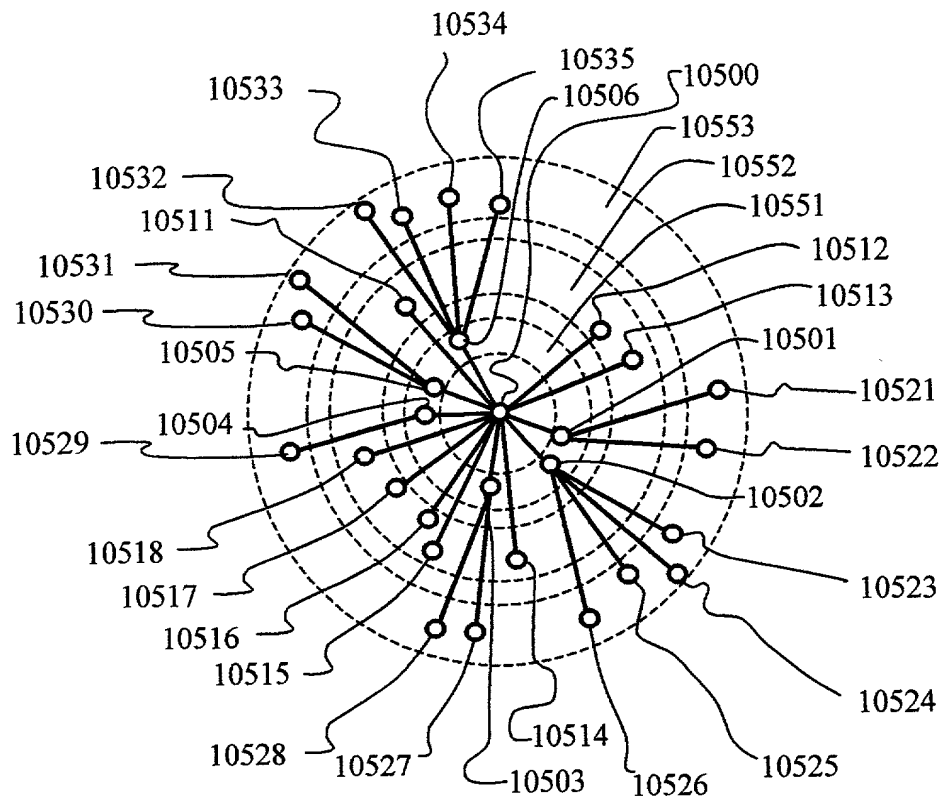


FIG. 105A

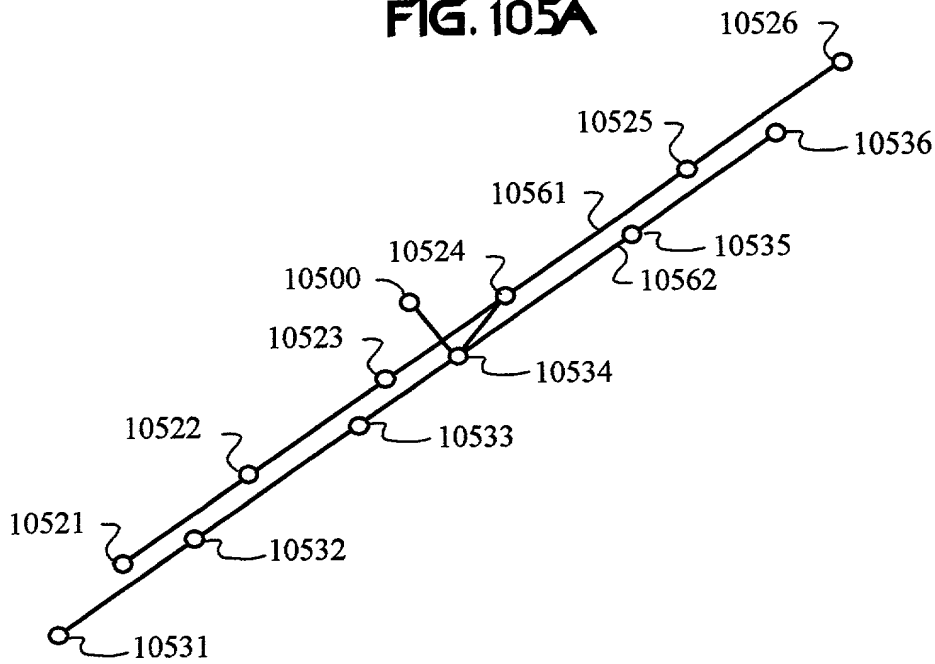


FIG. 105B

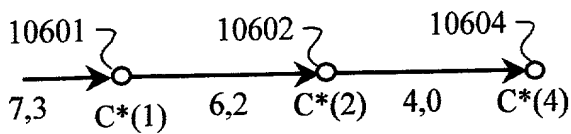


FIG. 106A

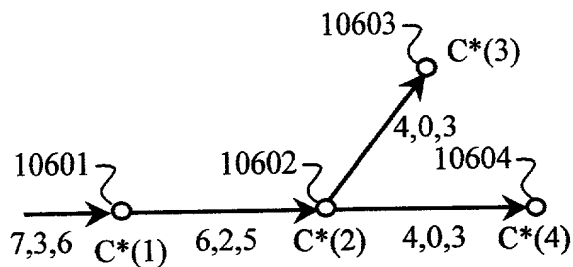


FIG. 106B

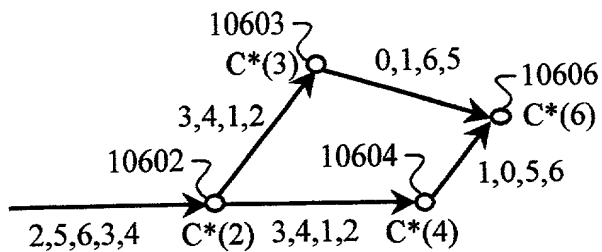


FIG. 106C

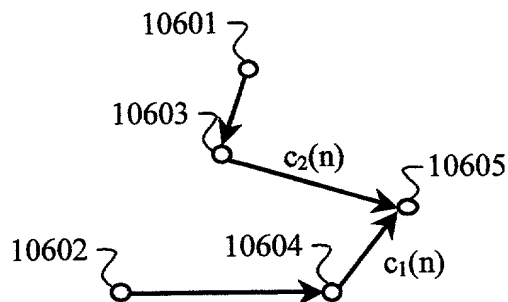


FIG. 106D

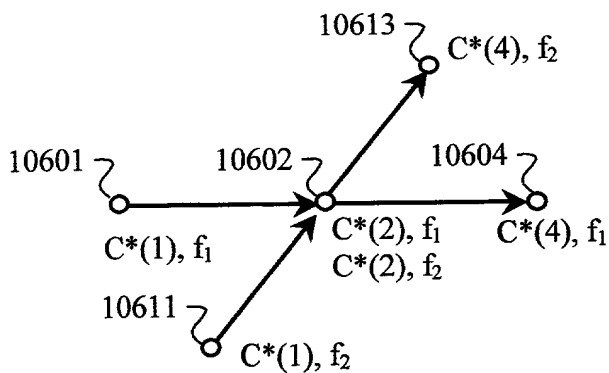


FIG. 106E

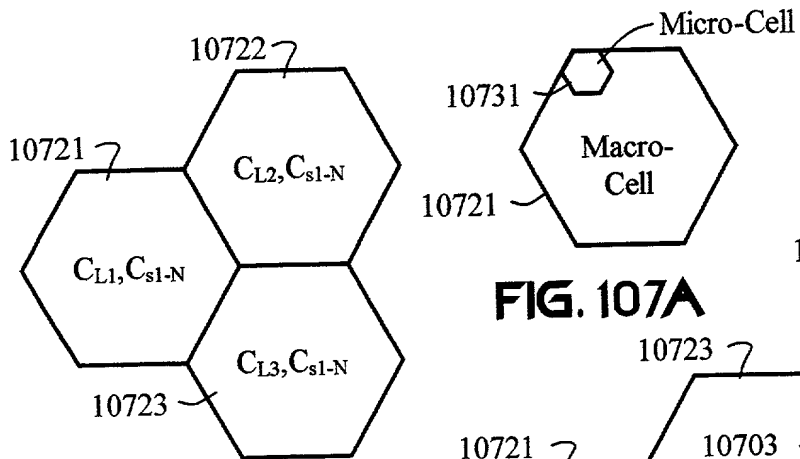
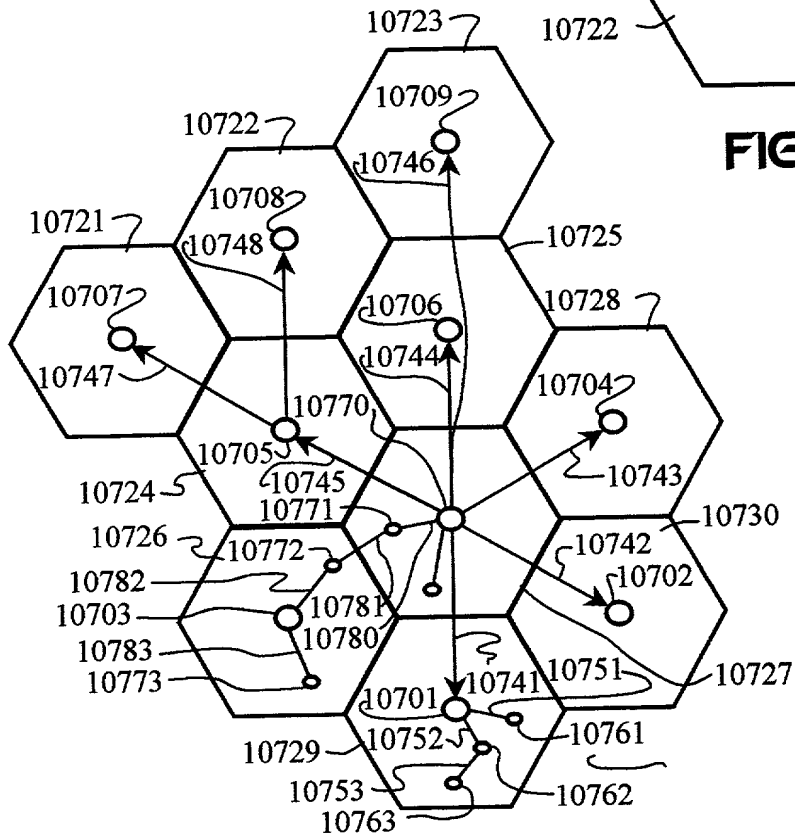
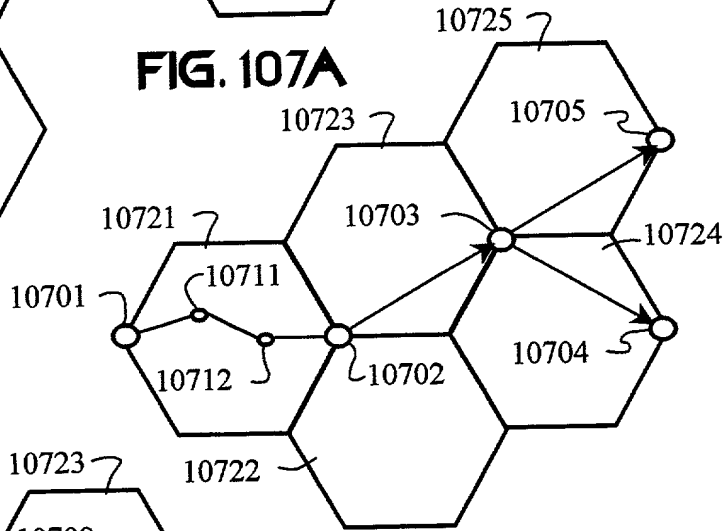


FIG. 107B



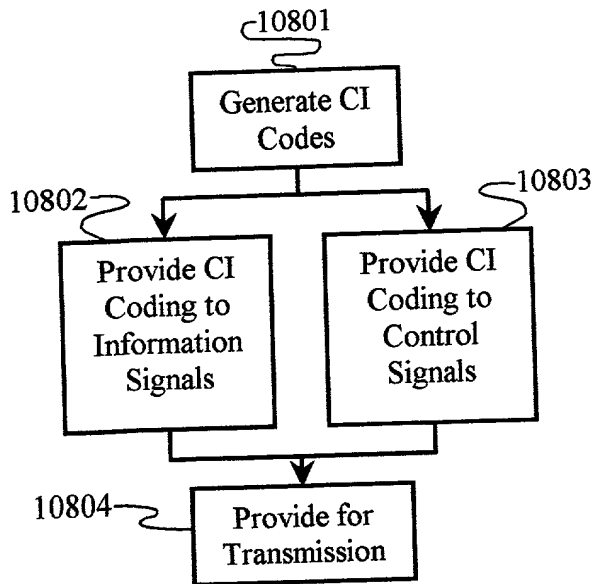


FIG. 108A

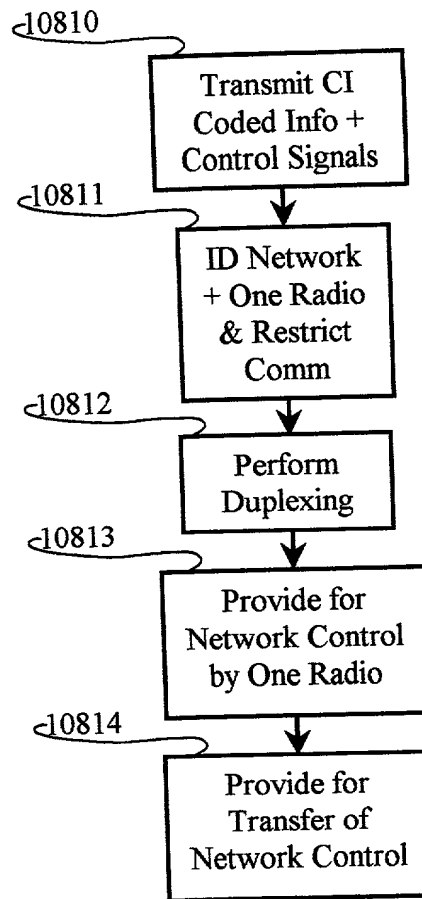


FIG. 108B

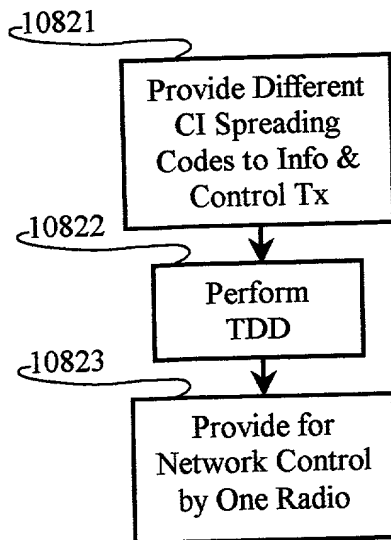


FIG. 108C

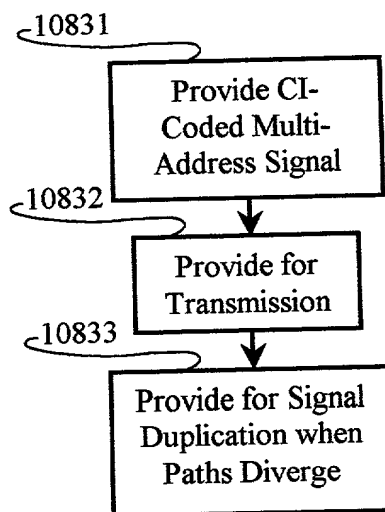
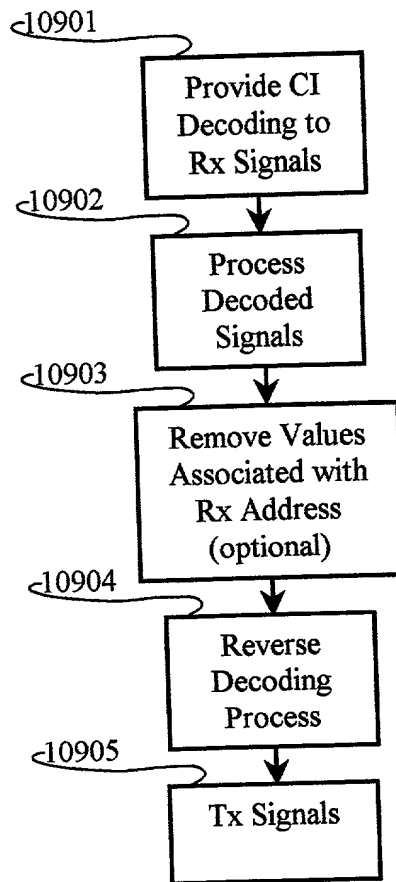
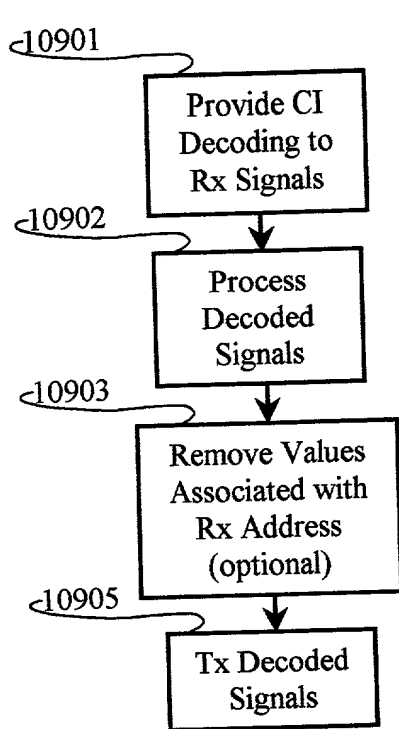


FIG. 108D



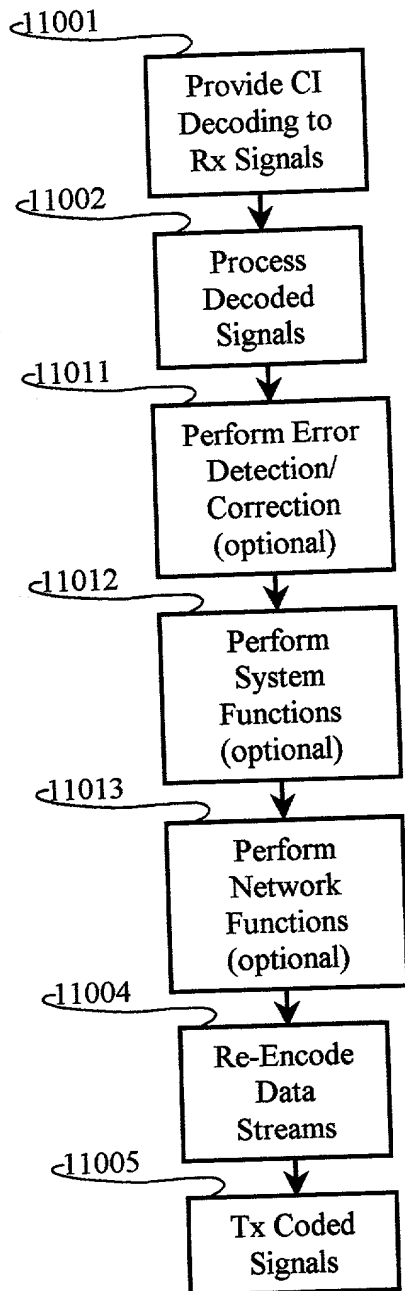


FIG. 110A

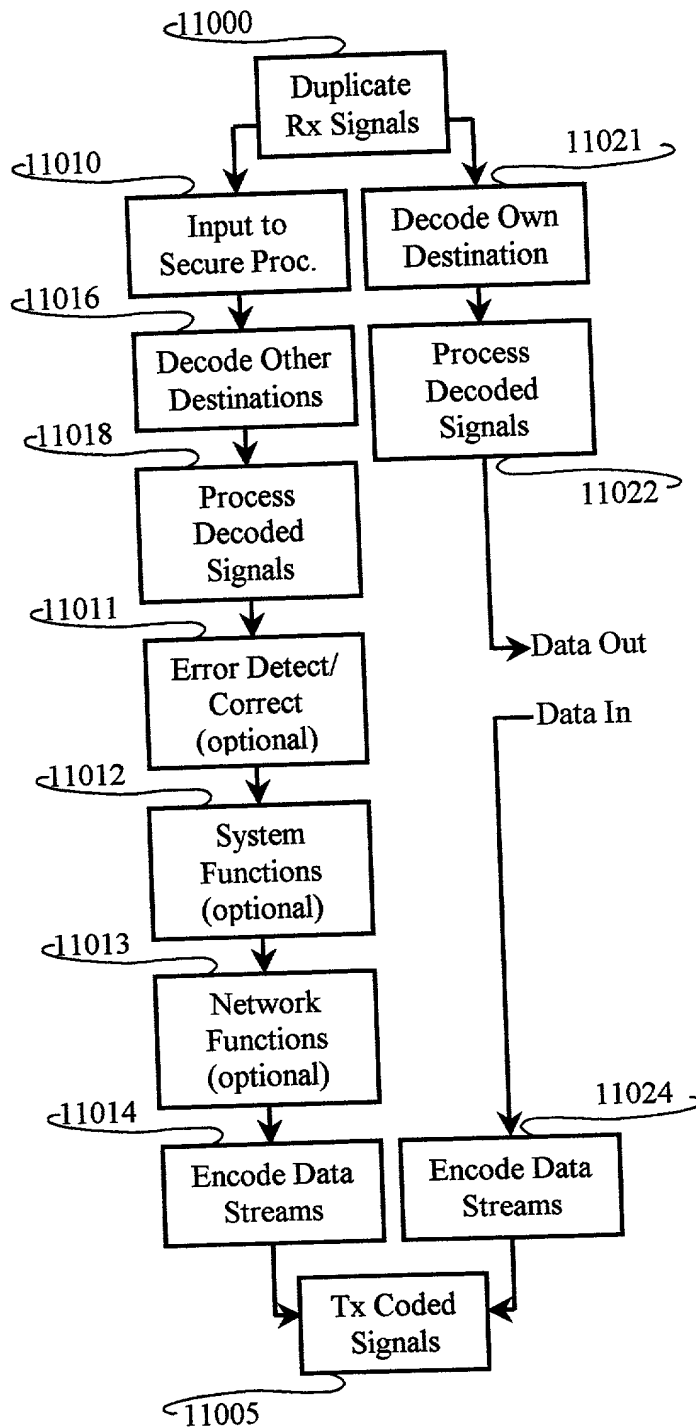


FIG. 110B

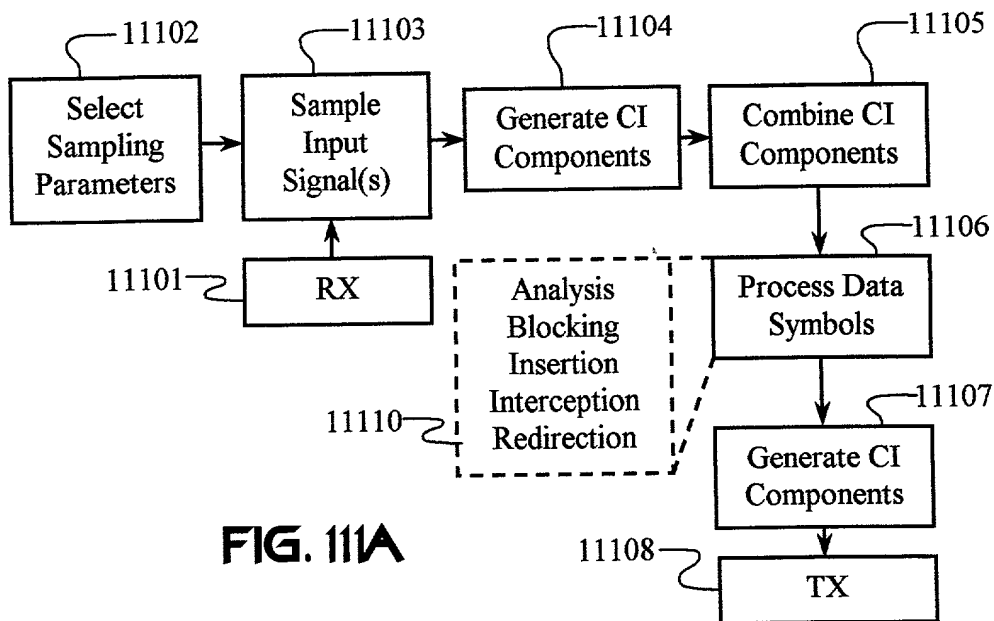


FIG. 111A

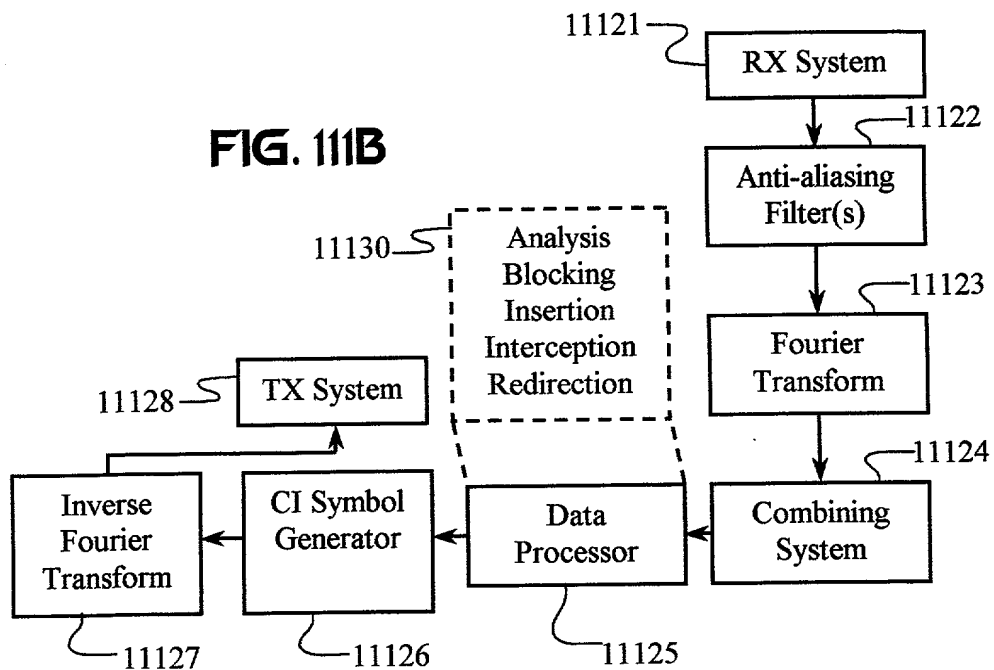


FIG. 111B