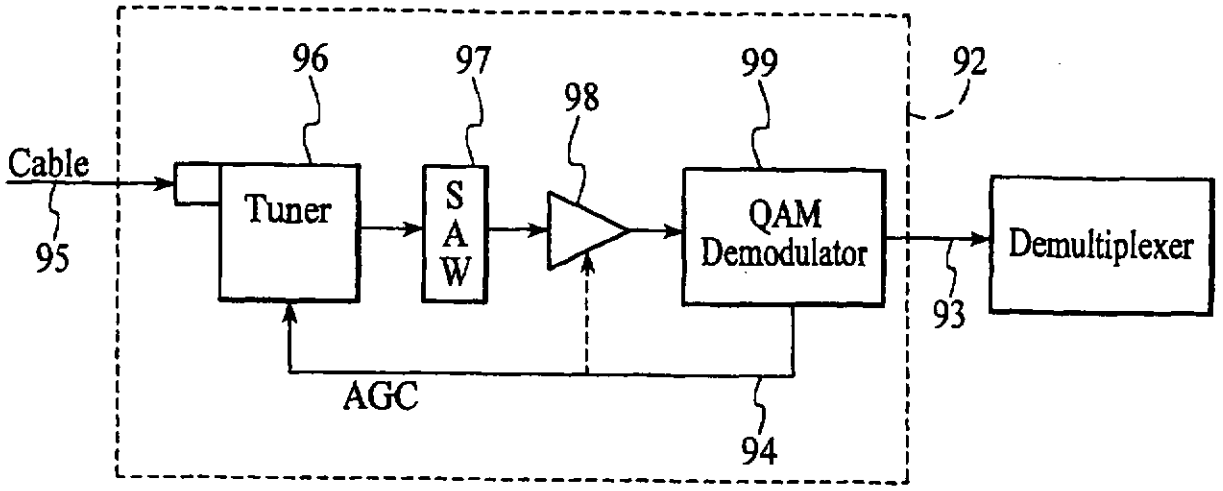

96
97
98
99
92
Cable
95
Tuner
S
A
W
QAM
Demodulator
Demultiplexer
93
AGC
94

FIG. 1

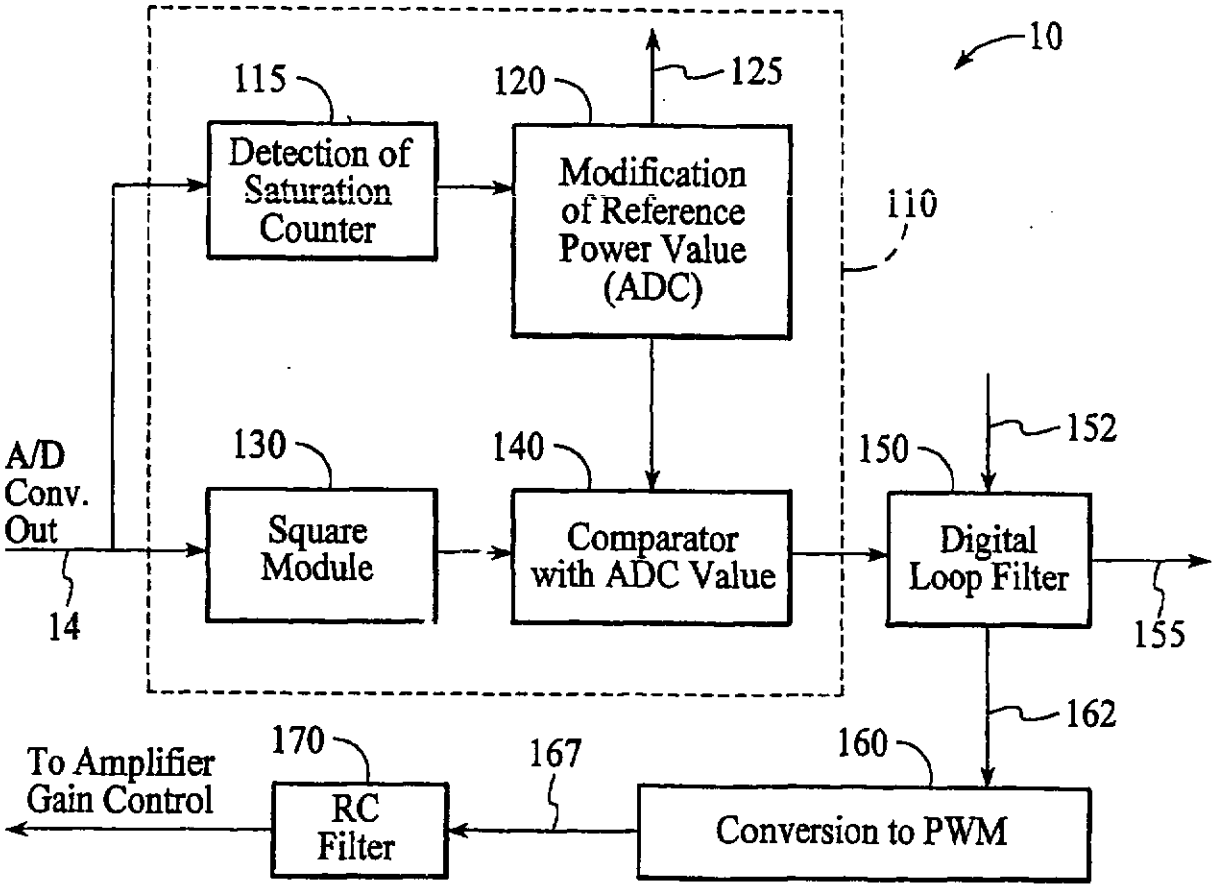

10
115
120
125
Detection of
Saturation
Counter
Modification
of Reference
Power Value
(ADC)
110
A/D
Conv.
Out
14
130
140
150
152
Square
Module
Comparator
with ADC Value
Digital
Loop Filter
155
162
To Amplifier
Gain Control
170
167
160
RC
Filter
Conversion to PWM

FIG. 3

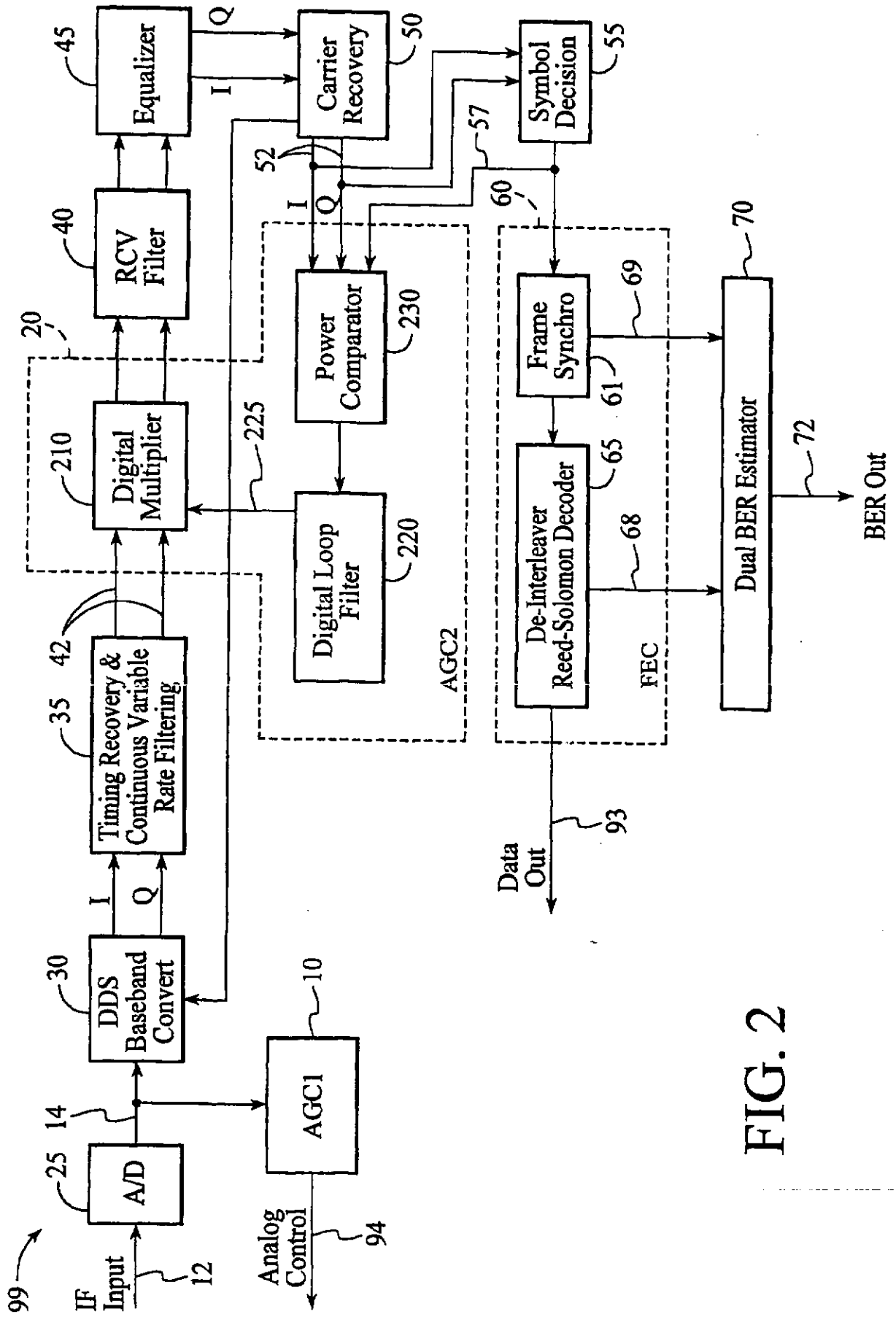

99
IF Input
12
25
A/D
14
30
DDS Baseband Convert
I
Q
35
Timing Recovery & Continuous Variable Rate Filtering
42
210
Digital Multiplier
20
40
RCV Filter
45
Equalizer
Q
I
225
AGC1
10
Analog Control
94
AGC2
Digital Loop Filter
220
Power Comparator
230
52
I
Q
Carrier Recovery
50
57
Symbol Decision
55
60
Frame Synchro
69
61
65
De-Interleaver Reed-Solomon Decoder
68
FEC
Data Out
93
70
Dual BER Estimator
72
BER Out

FIG. 2

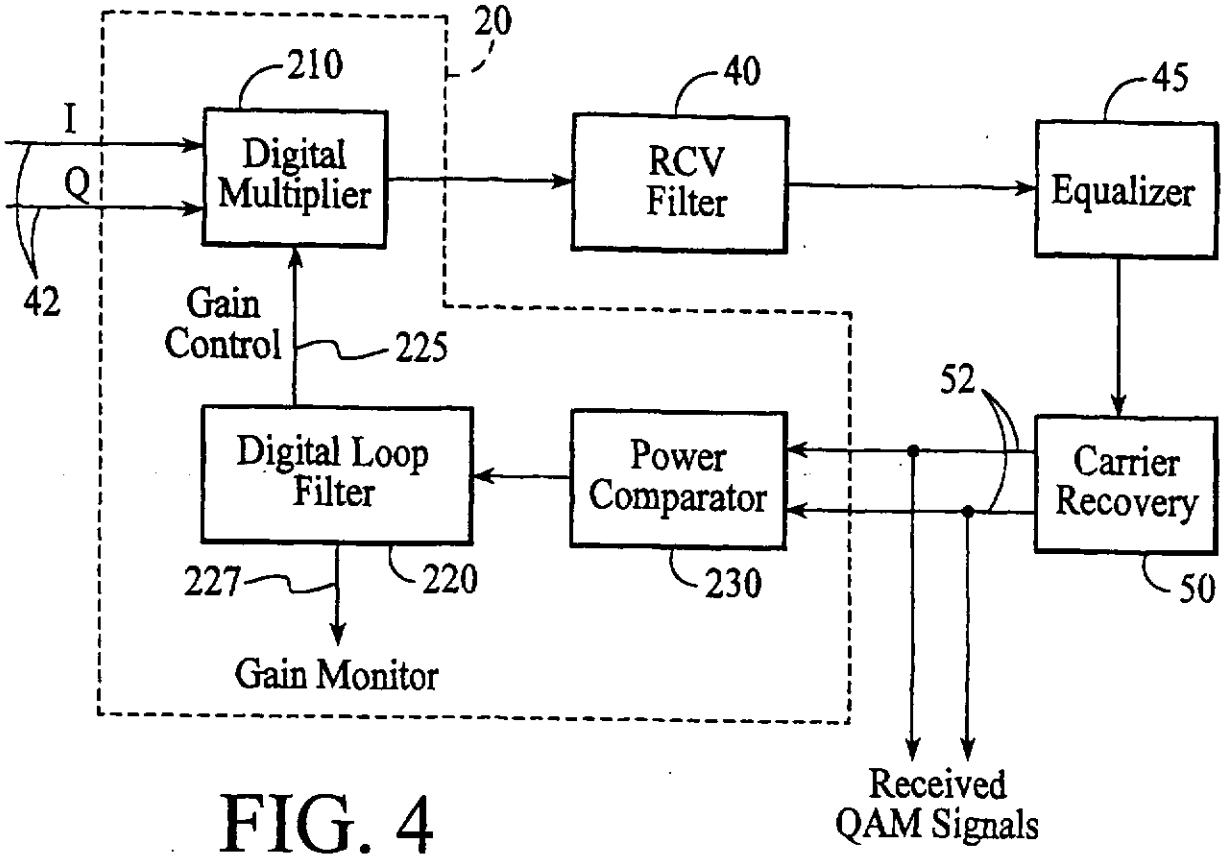

20
210
40
45
I
Q
Digital Multiplier
RCV Filter
Equalizer
42
Gain Control
225
52
Digital Loop Filter
Power Comparator
Carrier Recovery
227
220
230
50
Gain Monitor
Received QAM Signals

FIG. 4

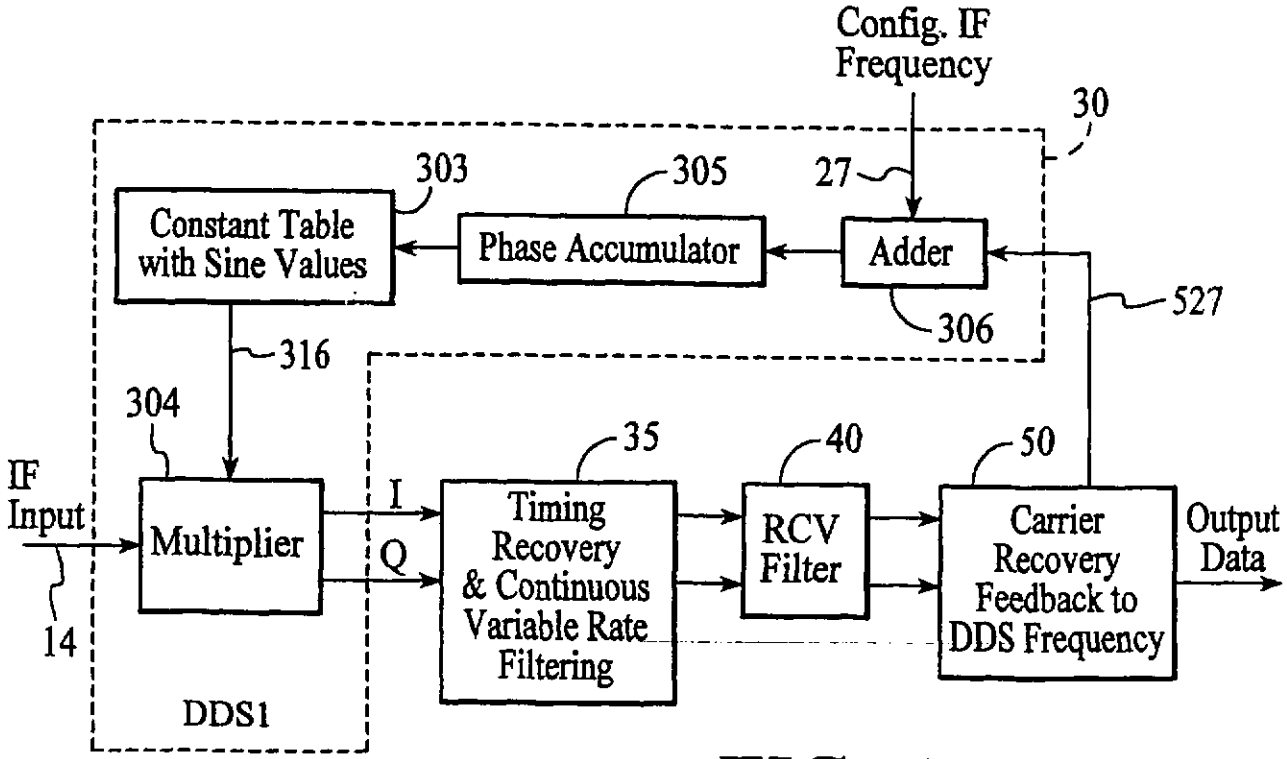

Config. IF Frequency
30
303
305
27
Constant Table with Sine Values
Phase Accumulator
Adder
306
527
316
304
35
40
50
IF Input
Multiplier
I
Q
Timing Recovery & Continuous Variable Rate Filtering
RCV Filter
Carrier Recovery Feedback to DDS Frequency
Output Data
14
DDS1

FIG. 6

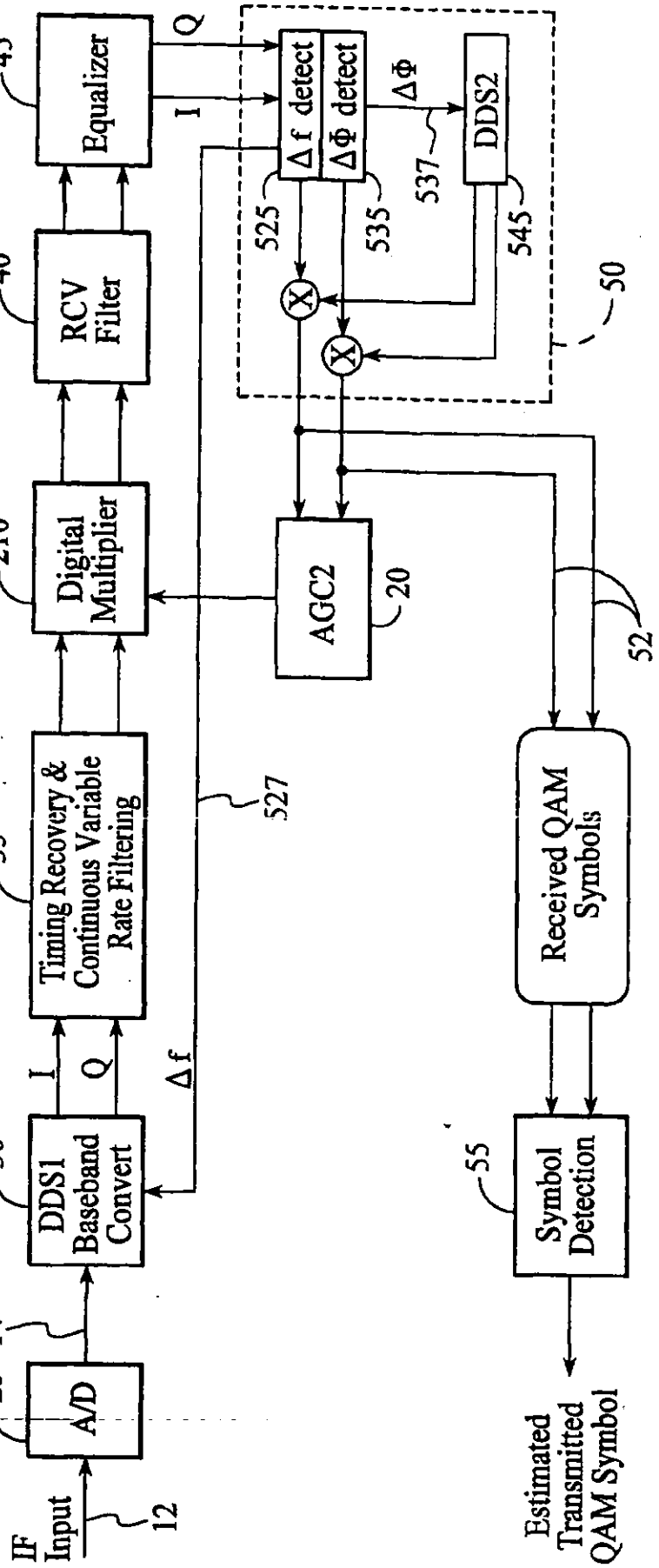

IF Input
12
A/D
25
14
DDS1 Baseband Convert
30
I
Q
Δf
Timing Recovery & Continuous Variable Rate Filtering
35
Digital Multiplier
210
RCV Filter
40
Equalizer
45
Q
I
Δf detect
Δφ detect
Δφ
DDS2
537
525
535
545
50
AGC2
20
527
52
Received QAM Symbols
Symbol Detection
55
Estimated Transmitted QAM Symbol

FIG. 5

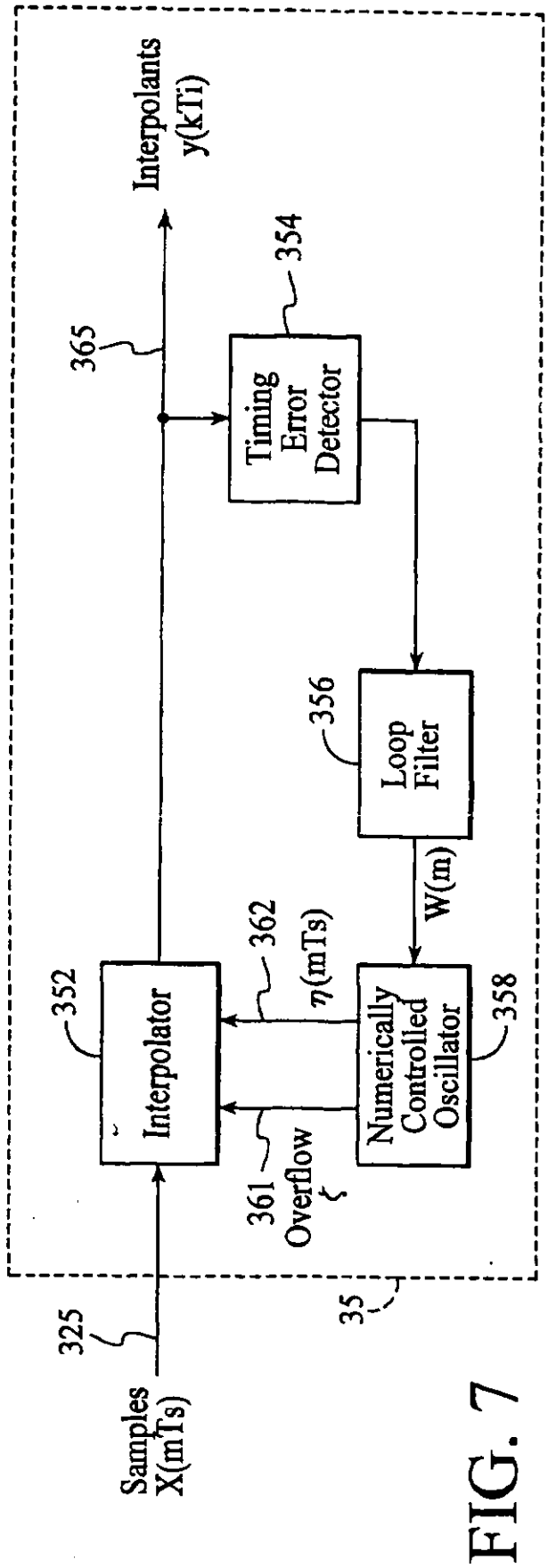

Samples X(mTs)
325
Interpolator
352
Numerically Controlled Oscillator
358
Loop Filter
356
Timing Error Detector
354
Interpolants y(kTi)
365
362
η(mTs)
361
Overflow
W(m)
35

FIG. 7

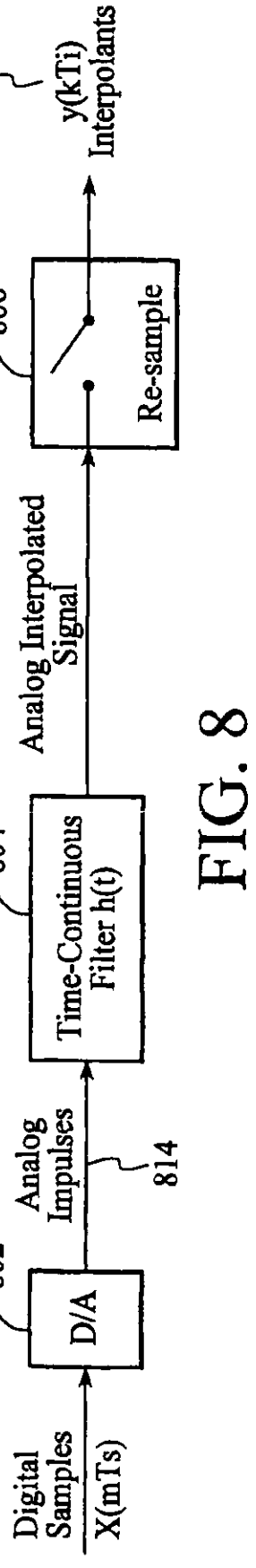

Digital Samples X(mTs)
802
D/A
Analog Impulses
814
Time-Continuous Filter h(t)
804
Analog Interpolated Signal
Re-sample
806
820
y(kTi) Interpolants

FIG. 8

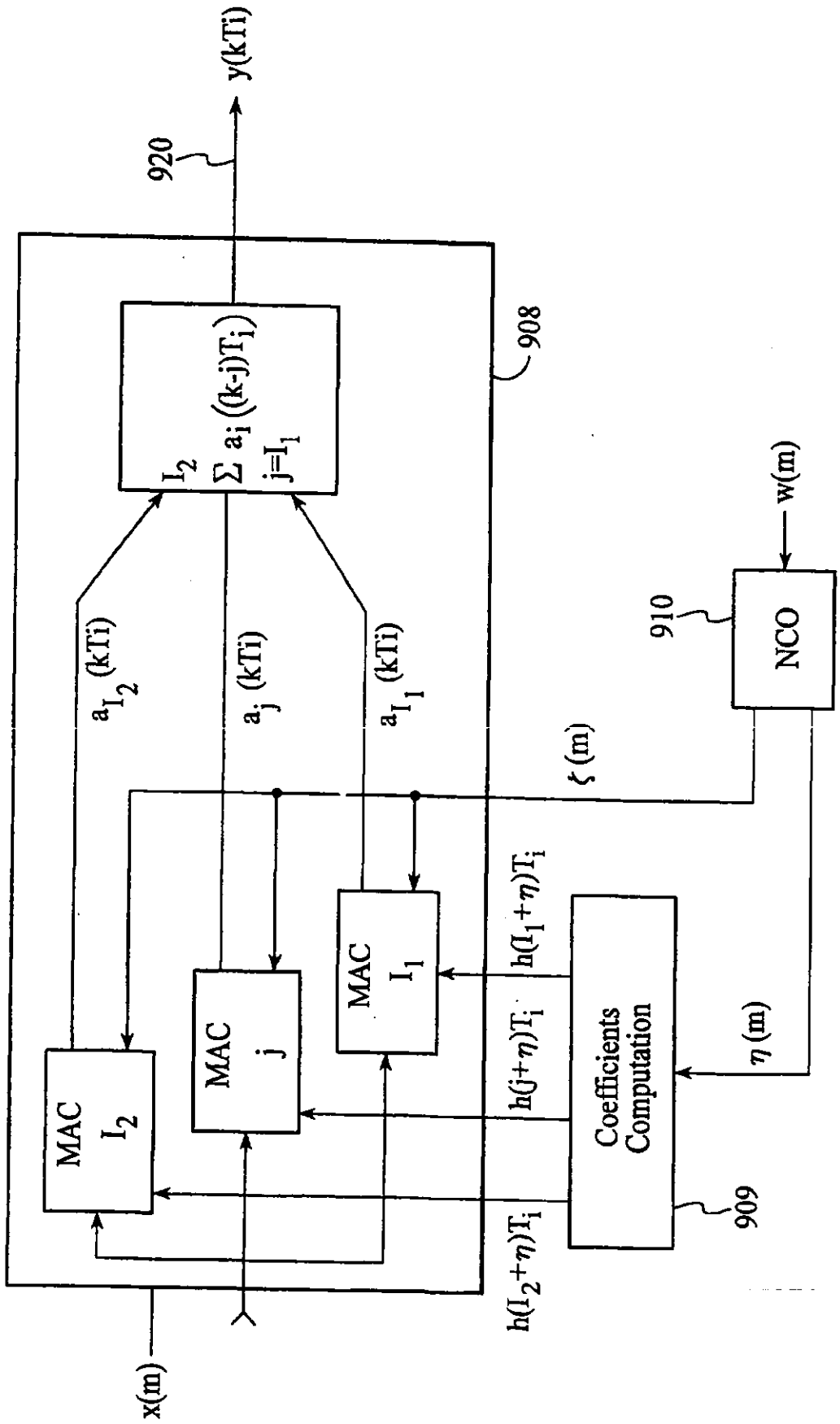

y(kTi)
920
908
$\sum_{j=I_1}^{I_2} a_j((k-j)T_i)$
$a_{I_2}(kTi)$
$a_j(kTi)$
$a_{I_1}(kTi)$
MAC I_2
MAC j
MAC I_1
$h(I_2+\eta)T_i$
$h(j+\eta)T_i$
$h(I_1+\eta)T_i$
Coefficients Computation
909
η (m)
ζ (m)
910
NCO
w(m)
x(m)

FIG. 9

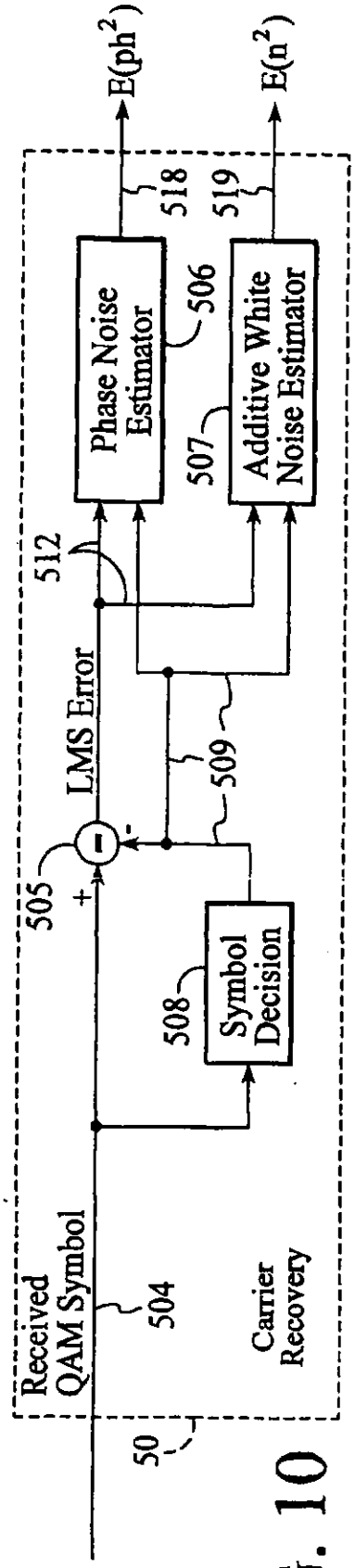

Received QAM Symbol
504
50
Carrier Recovery
505
LMS Error
512
509
Phase Noise Estimator
506
Additive White Noise Estimator
507
Symbol Decision
508
$E(ph^2)$
$E(n^2)$
518
519

FIG. 10

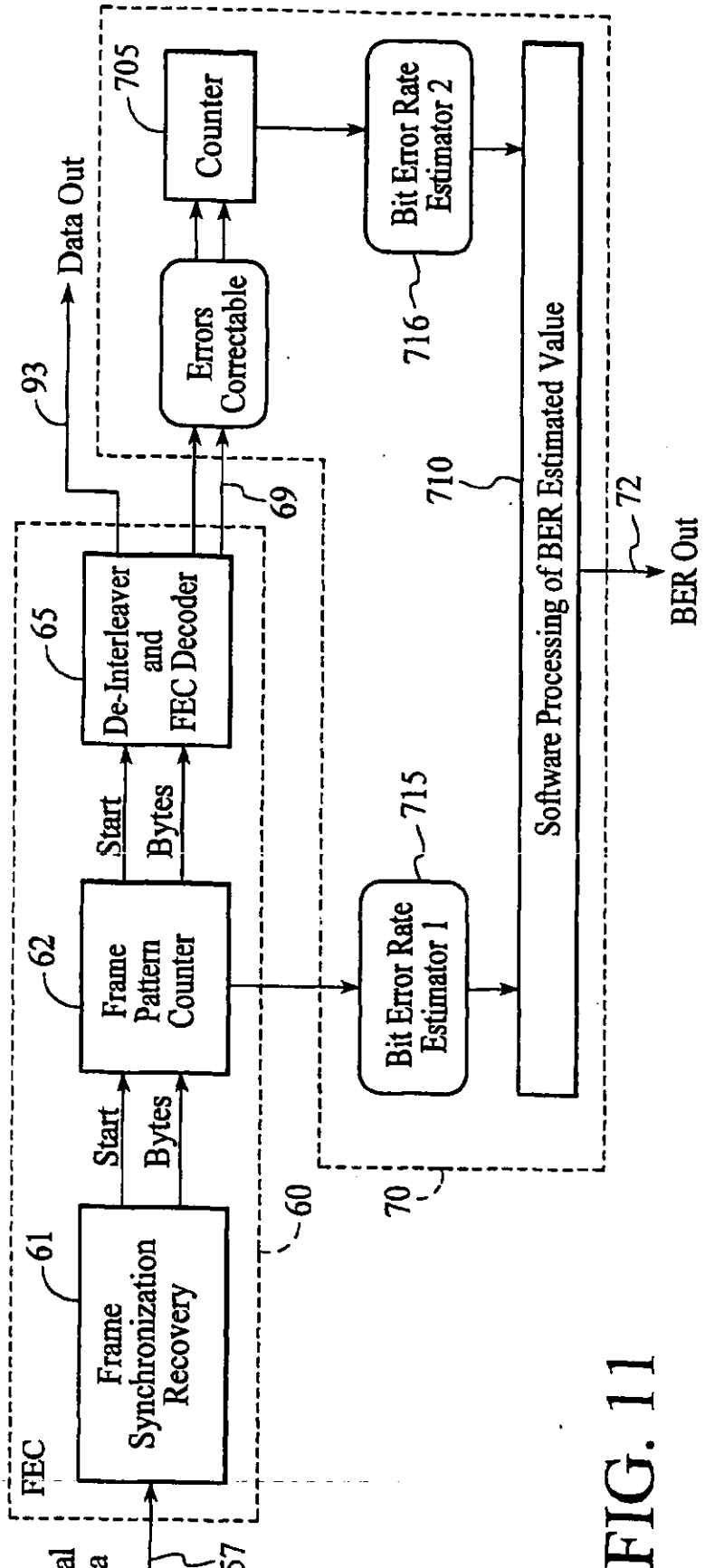

Serial Data In
57
FEC
Frame Synchronization Recovery
61
Start
Bytes
Frame Pattern Counter
62
De-Interleaver and FEC Decoder
65
Errors Correctable
Counter
705
Data Out
93
69
60
70
Bit Error Rate Estimator 1
715
Bit Error Rate Estimator 2
716
Software Processing of BER Estimated Value
710
72
BER Out

FIG. 11