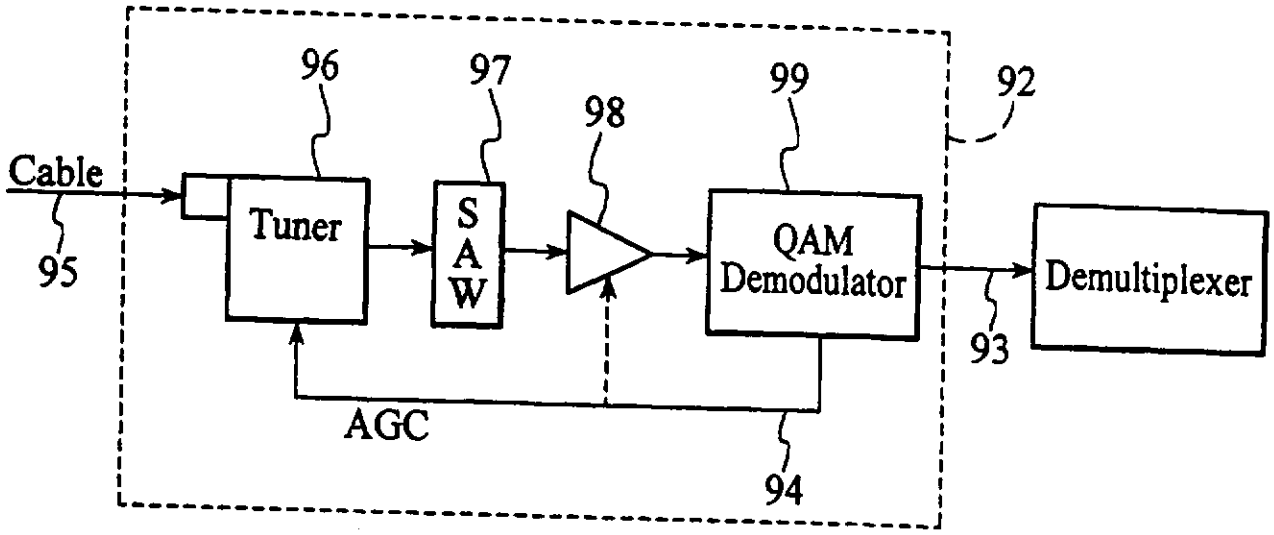

96
97
98
99
92
Cable
95
Tuner
S
A
W
QAM
Demodulator
Demultiplexer
93
AGC
94

FIG. 1

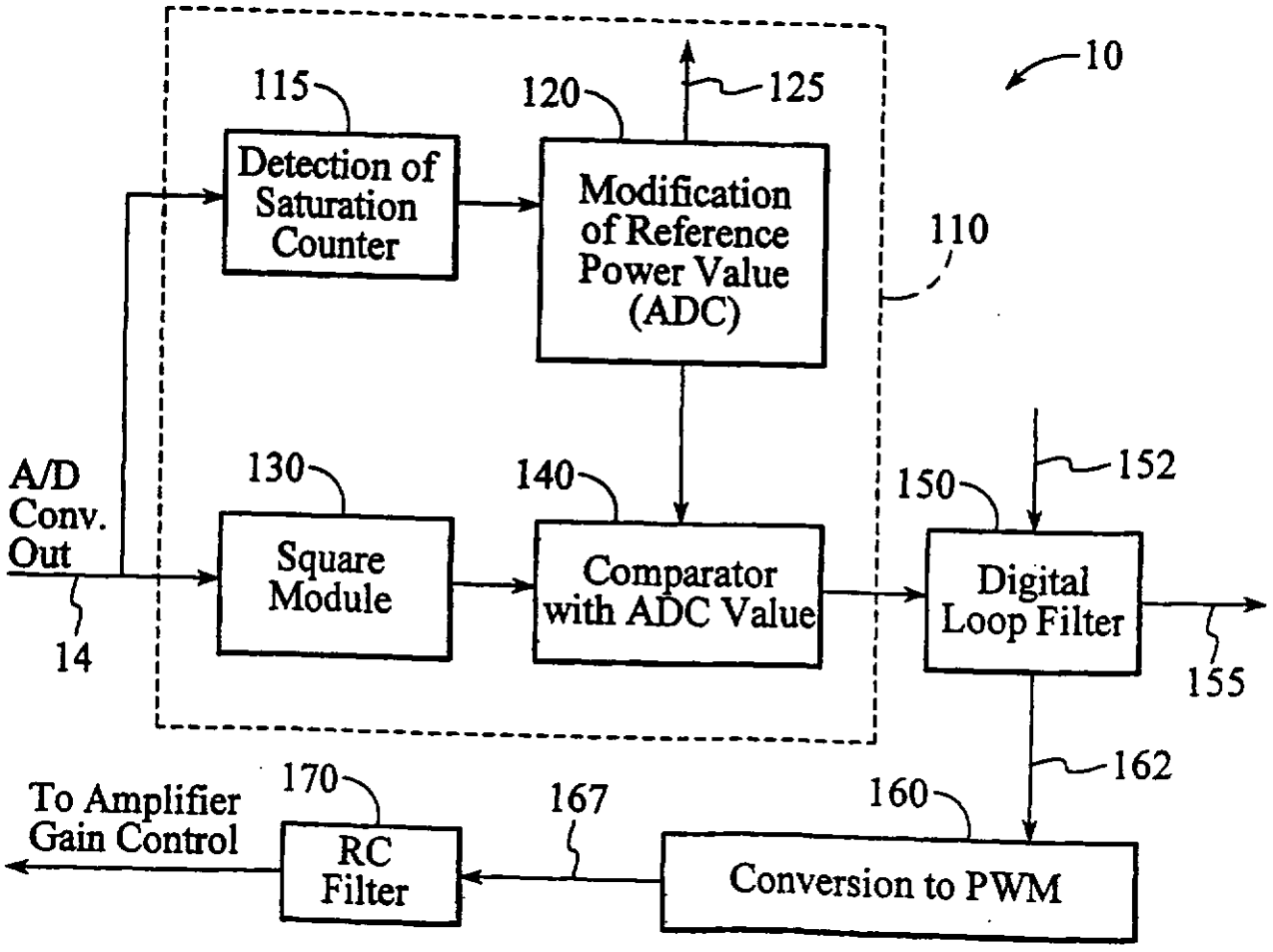

10
115
120
125
Detection of
Saturation
Counter
Modification
of Reference
Power Value
(ADC)
110
A/D
Conv.
Out
14
130
Square
Module
140
Comparator
with ADC Value
150
152
Digital
Loop Filter
155
162
To Amplifier
Gain Control
170
RC
Filter
167
160
Conversion to PWM

FIG. 3

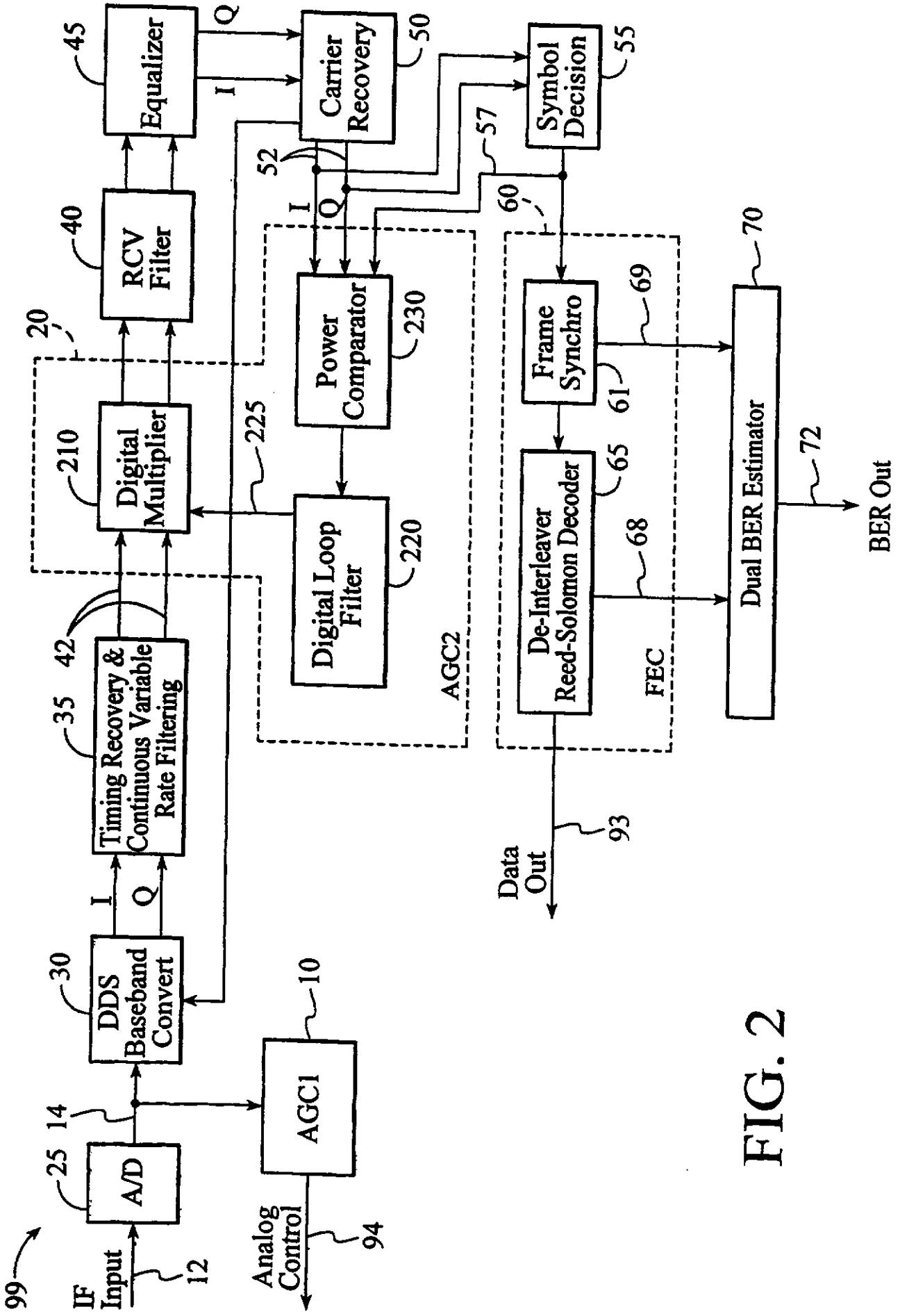

99
IF Input
12
A/D
25
14
AGC1
10
Analog Control
94
DDS Baseband Convert
30
I
Q
Timing Recovery & Continuous Variable Rate Filtering
35
42
Digital Multiplier
210
RCV Filter
40
Equalizer
45
Q
I
Carrier Recovery
50
52
I
Q
Power Comparator
230
Digital Loop Filter
220
225
20
AGC2
57
Symbol Decision
55
60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

FIG. 2

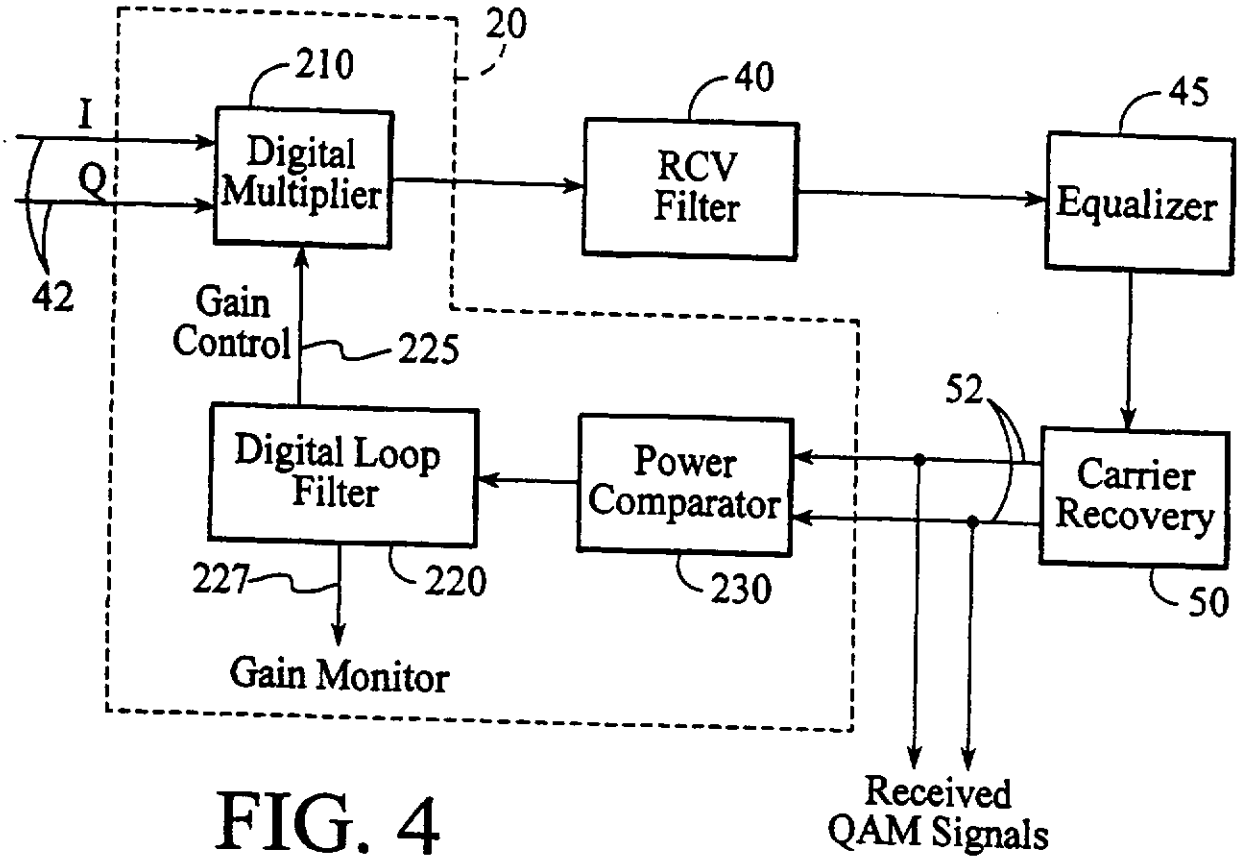

20
210
I
Q
42
Digital Multiplier
40
RCV Filter
45
Equalizer
Gain Control
225
52
Digital Loop Filter
Power Comparator
Carrier Recovery
227
220
230
50
Gain Monitor
Received QAM Signals

FIG. 4

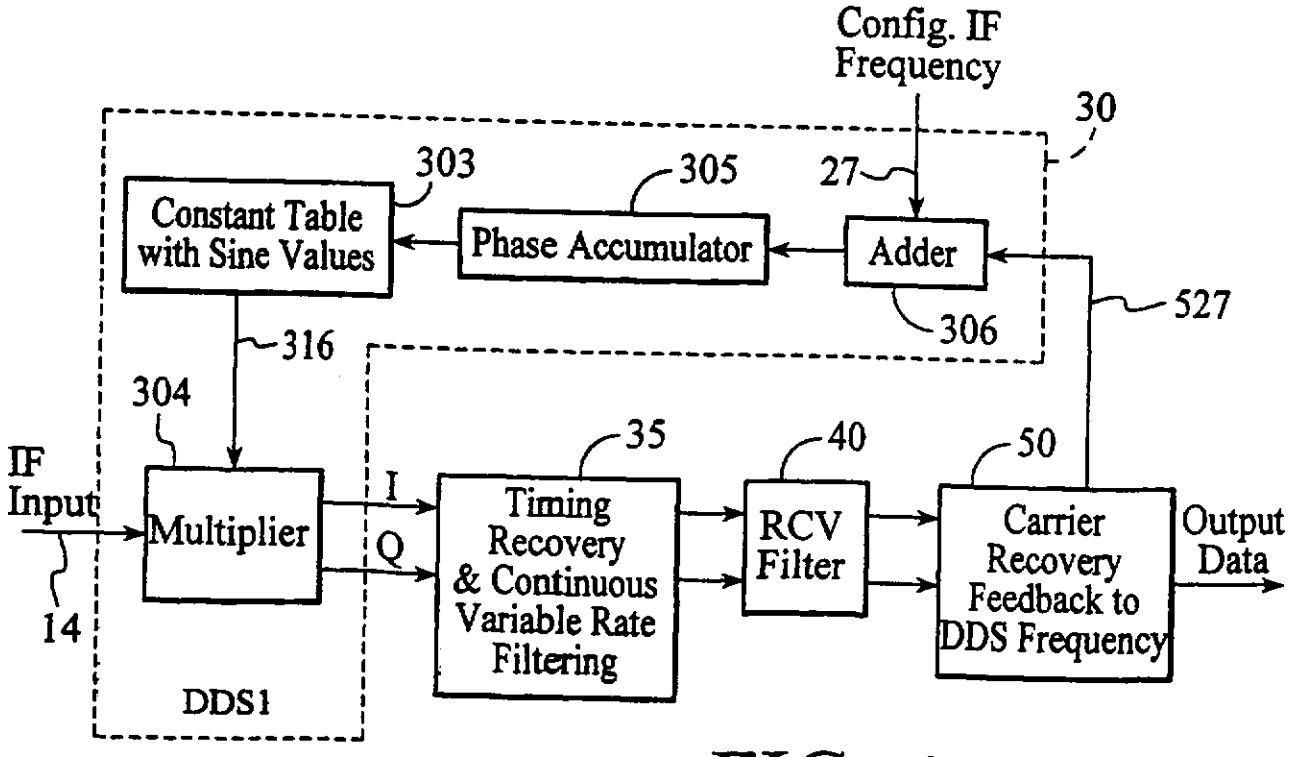

Config. IF Frequency
30
303
305
27
Constant Table with Sine Values
Phase Accumulator
Adder
306
527
316
304
35
40
50
IF Input
Multiplier
I
Q
Timing Recovery & Continuous Variable Rate Filtering
RCV Filter
Carrier Recovery Feedback to DDS Frequency
Output Data
14
DDS1

FIG. 6

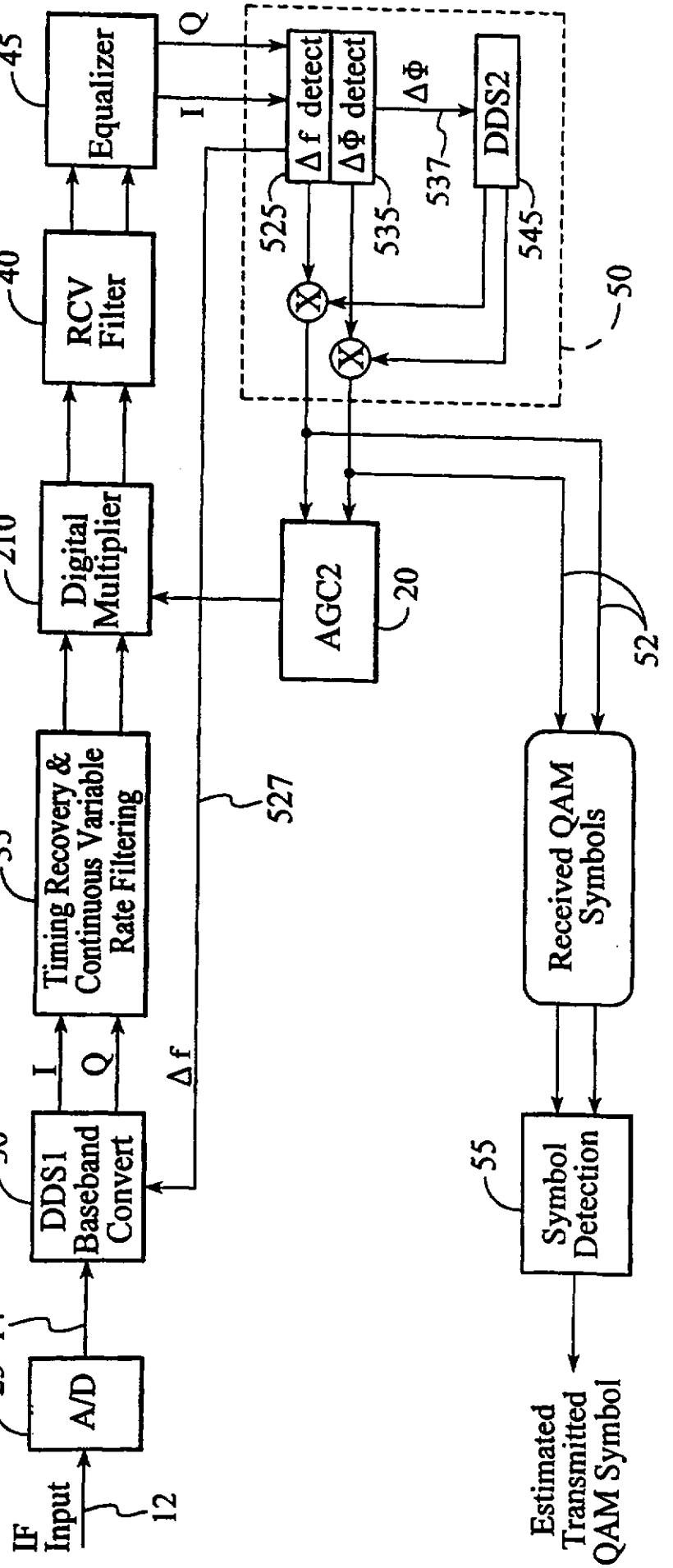

IF Input
12
A/D
25
14
DDS1 Baseband Convert
30
I
Q
Δf
Timing Recovery & Continuous Variable Rate Filtering
35
Digital Multiplier
210
RCV Filter
40
Equalizer
45
Q
I
Δf detect
Δφ detect
Δφ
DDS2
525
535
537
545
50
AGC2
20
527
52
Received QAM Symbols
Symbol Detection
55
Estimated Transmitted QAM Symbol

FIG. 5

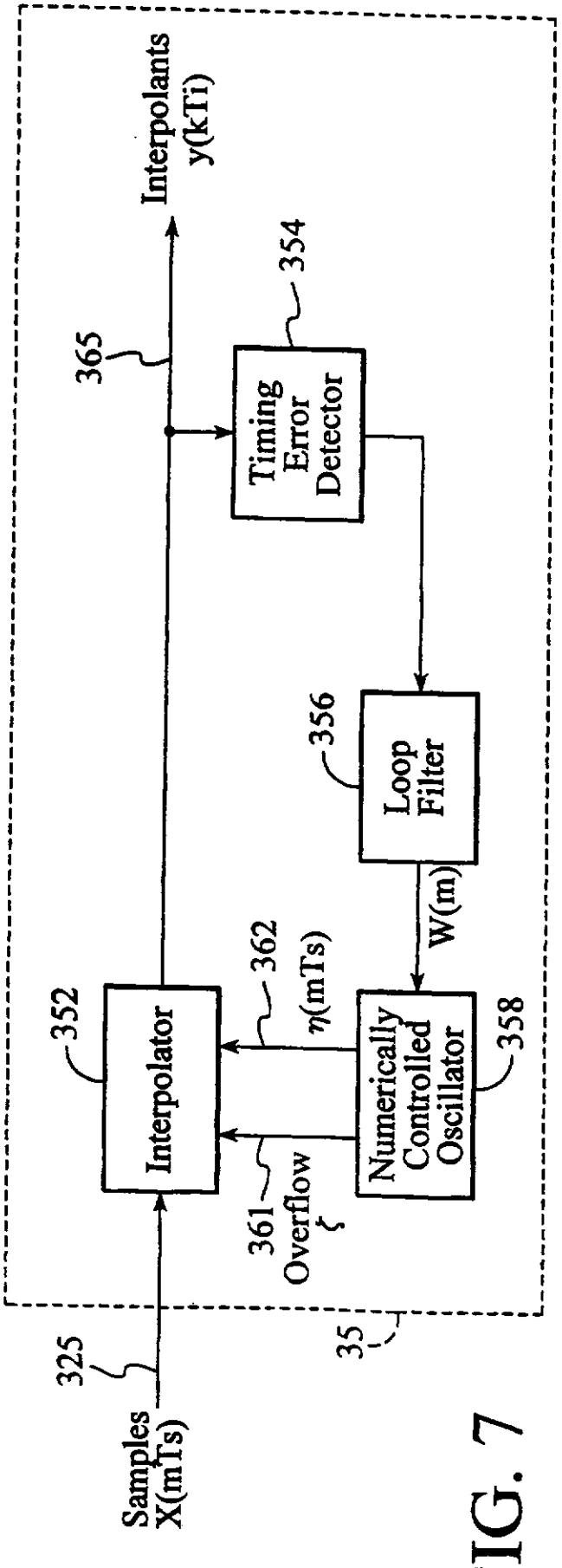

Interpolants
y(kTi)
365
354
Timing
Error
Detector
356
Loop
Filter
W(m)
362
η(mTs)
352
Interpolator
Numerically
Controlled
Oscillator
358
361
Overflow
35
325
Samples
X(mTs)

FIG. 7

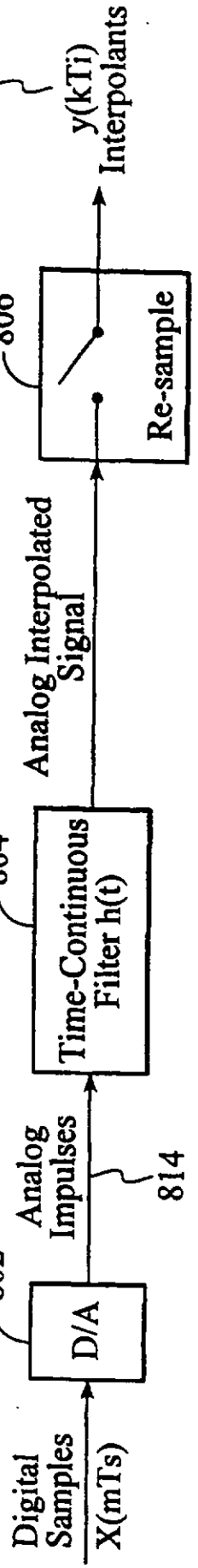

820
y(kTi)
Interpolants
806
Re-sample
Analog Interpolated
Signal
804
Time-Continuous
Filter h(t)
Analog
Impulses
814
802
D/A
Digital
Samples
X(mTs)

FIG. 8

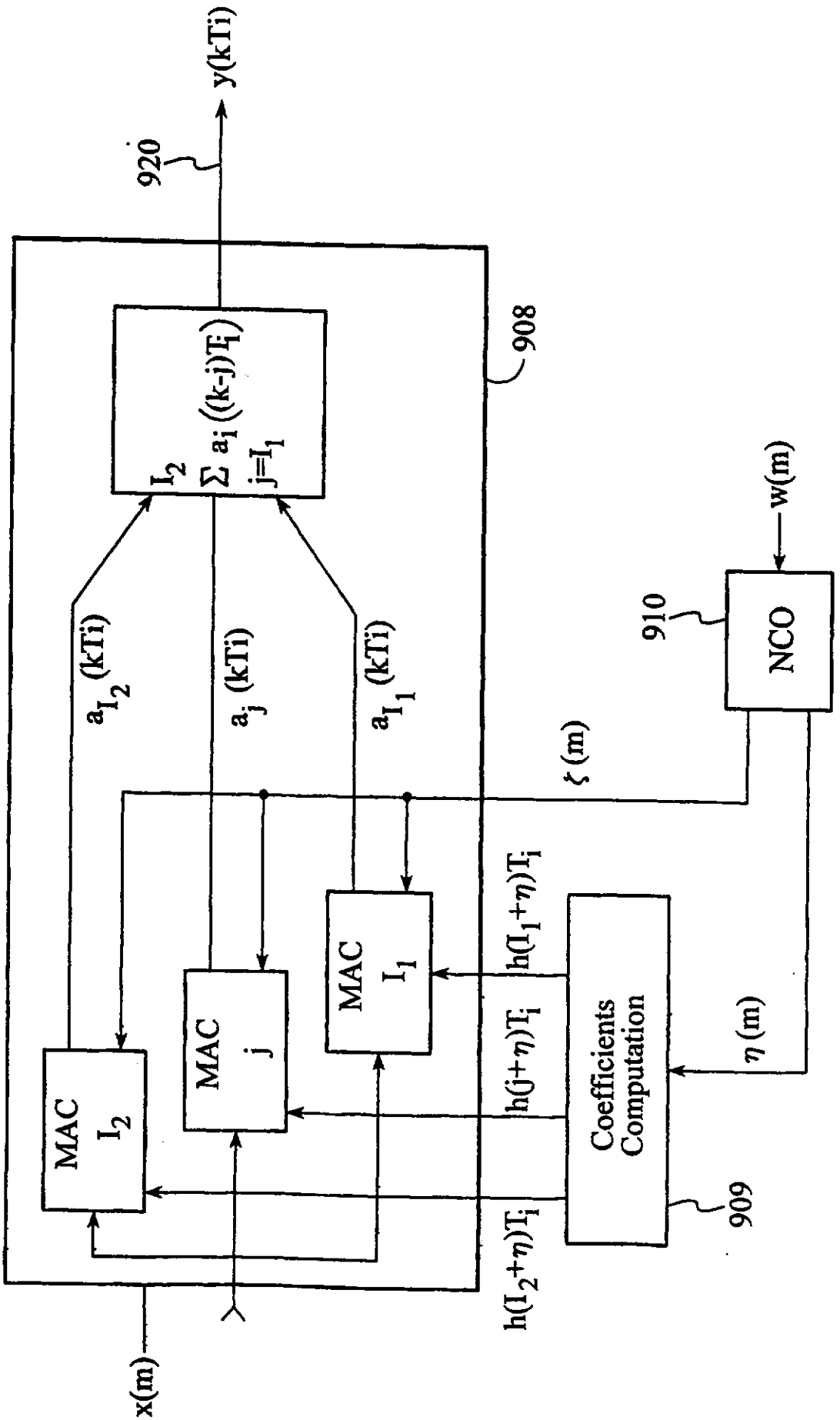

y(kTi)
920
908
$\sum_{j=I_1}^{I_2} a_i((k-j)T_i)$
$a_{I_2}(kTi)$
$a_j(kTi)$
$a_{I_1}(kTi)$
w(m)
910
NCO
ζ(m)
MAC I_2
MAC j
MAC I_1
$h(I_2+\eta)T_i$
$h(j+\eta)T_i$
$h(I_1+\eta)T_i$
Coefficients Computation
η(m)
909
x(m)

FIG. 9

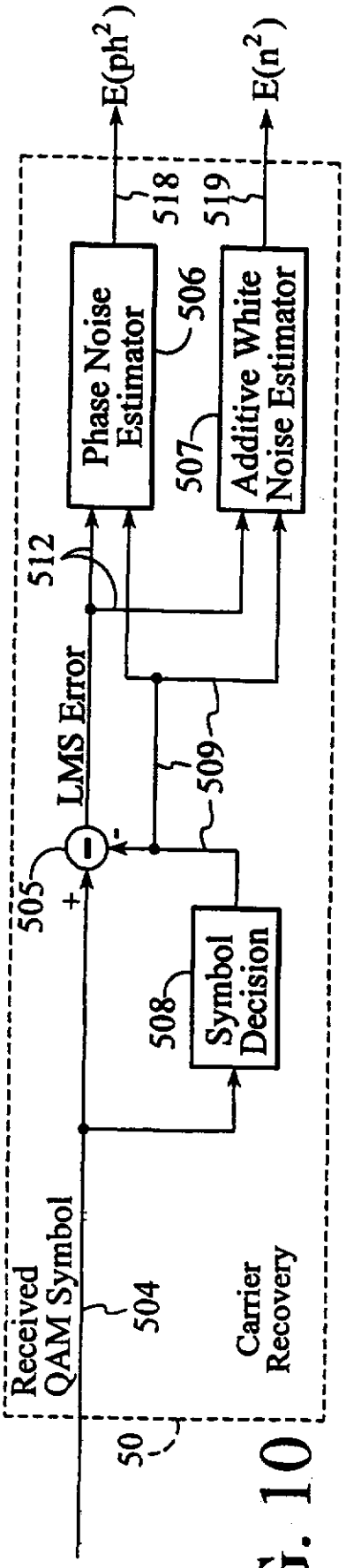

Received QAM Symbol
504
Carrier Recovery
50
505
+
-
LMS Error
512
509
508
Symbol Decision
Phase Noise Estimator
506
507
Additive White Noise Estimator
518
519
E(ph²)
E(n²)

FIG. 10

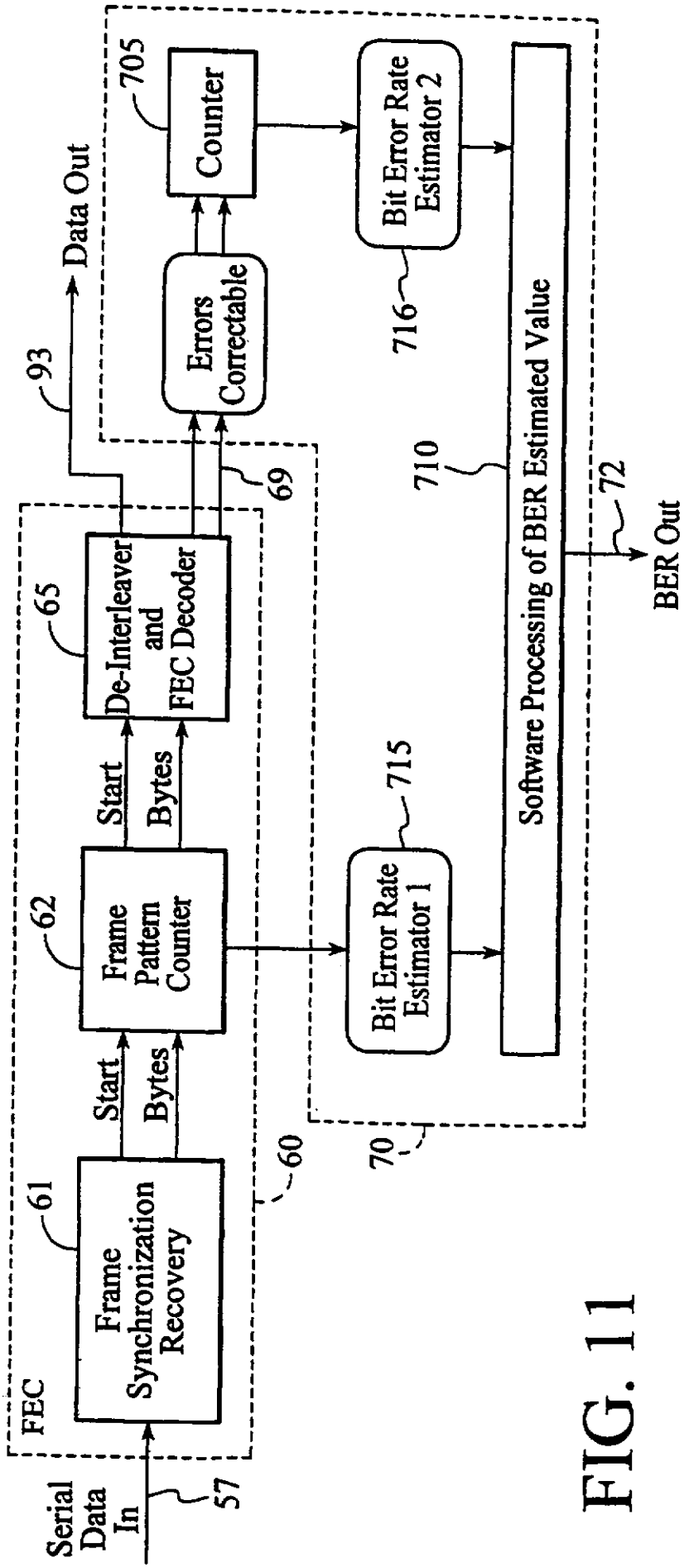

Serial Data In
57
FEC
60
61
Frame Synchronization Recovery
Start
Bytes
62
Frame Pattern Counter
65
De-Interleaver and FEC Decoder
69
93
Data Out
Errors Correctable
705
Counter
710
715
Bit Error Rate Estimator 1
716
Bit Error Rate Estimator 2
70
Software Processing of BER Estimated Value
72
BER Out

FIG. 11