PRINT OF DRAWINGS
AS ORIGINALLY FILE

Fig 92

PRINT OF DRAWINGS
AS ORIGINALLY FILF

Fig 93

PRINT OF DRAWINGS
AS ORIGINALLY FILE

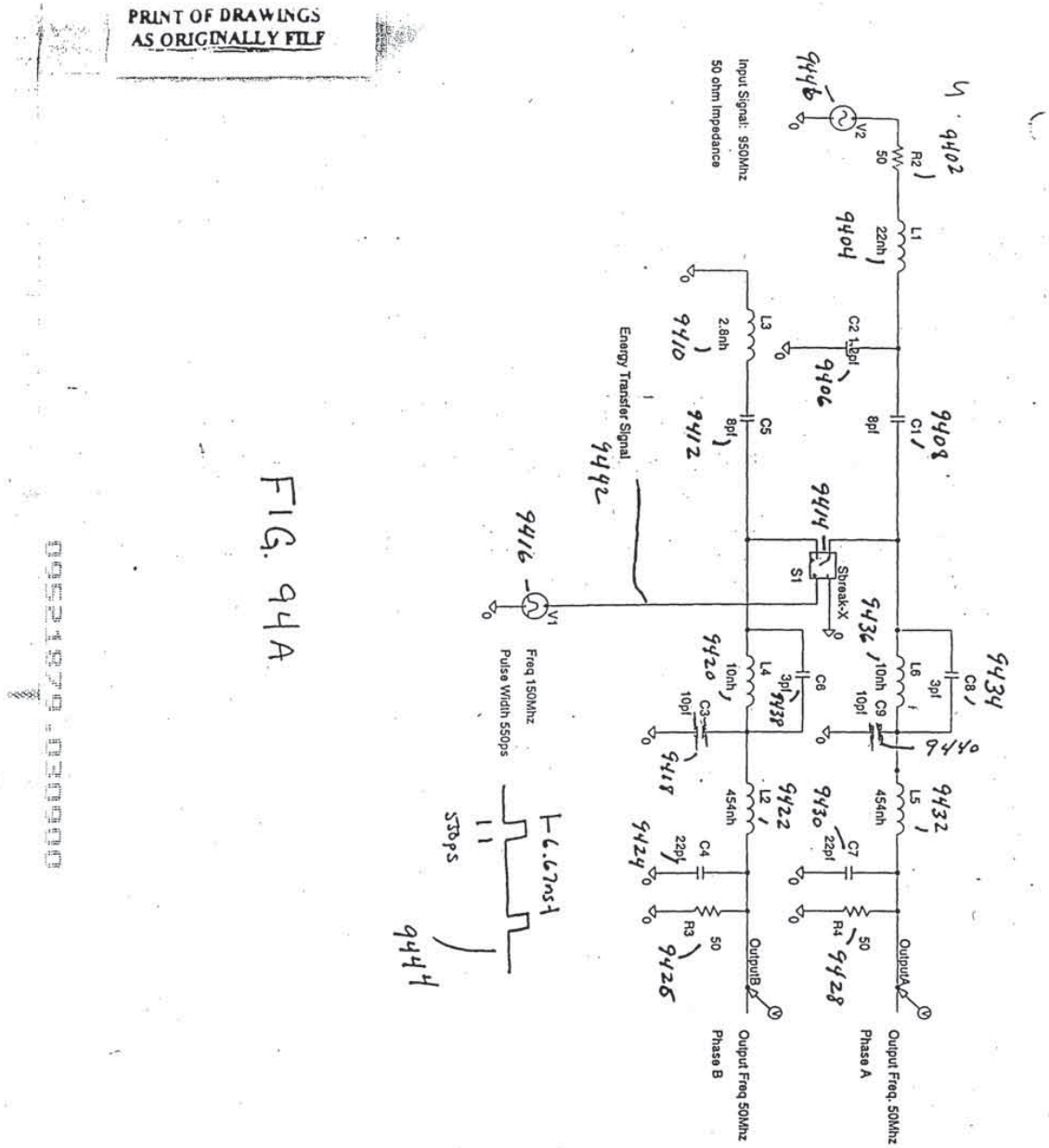


FIG. 94A

PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG 94B

FIG 94C

PRINT OF DRAWINGS
AS ORIGINALLY FILE

Fig 95

PRINT OF DRAWINGS
AS ORIGINALLY FILF

FIG. 96

PRINT OF DRAWINGS
AS ORIGINALLY FILI

FIG. 97

PRINT OF DRAWINGS
AS ORIGINALLY FILE

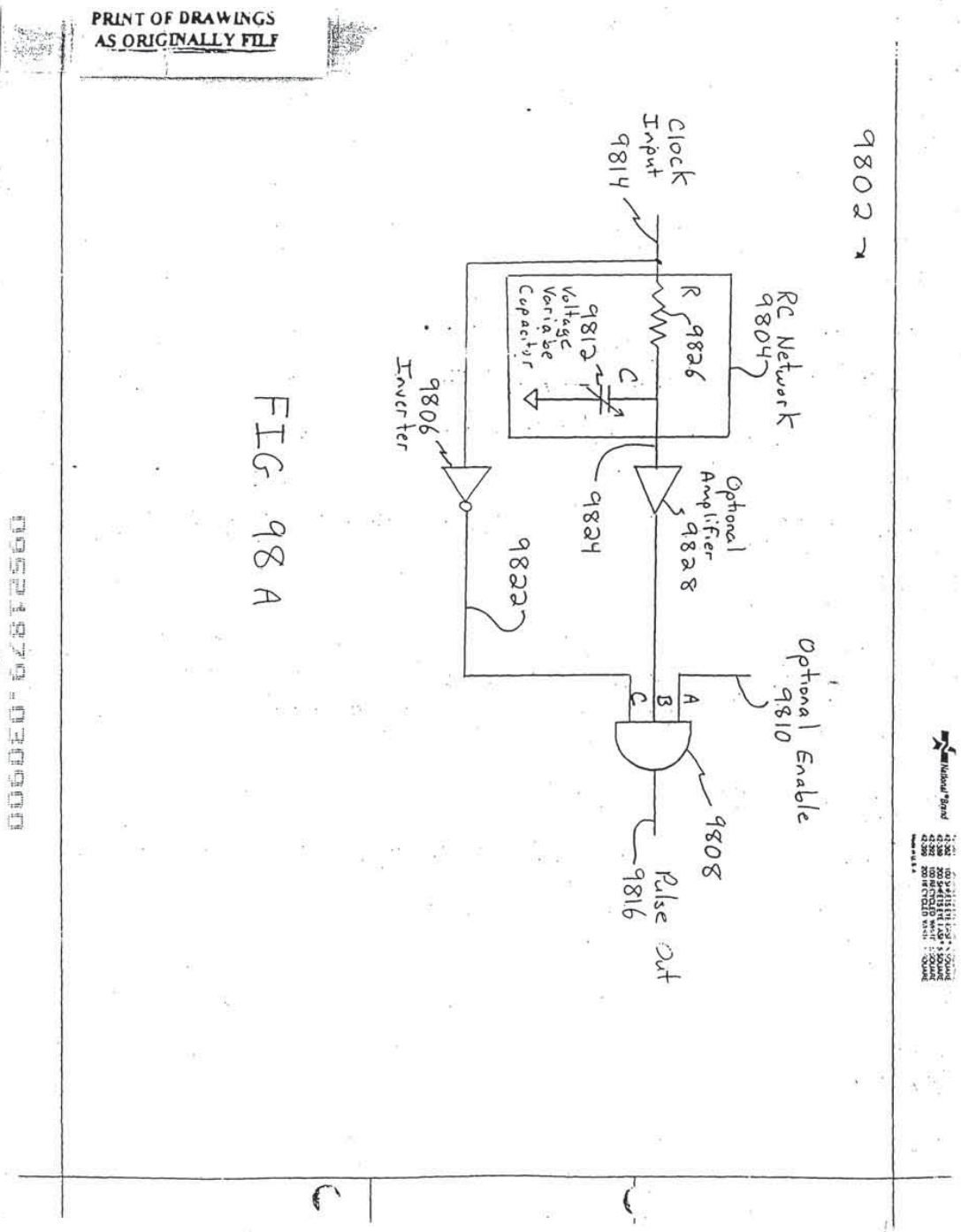


FIG. 98A

PRINT OF DRAWINGS
AS ORIGINALLY FILE
Clock
9814
FIG. 98 B
Optional Enable 9810
FIG. 98C
Inverted Clock 9822
FIG. 98D
Delayed Clock 9824
less
C
FIG. 98E
Energy Transfer Signal 9816
Pulses
9818
9820
Aperture
G. 98F

PRINT OF DRAWINGS
AS ORIGINALLY FILE

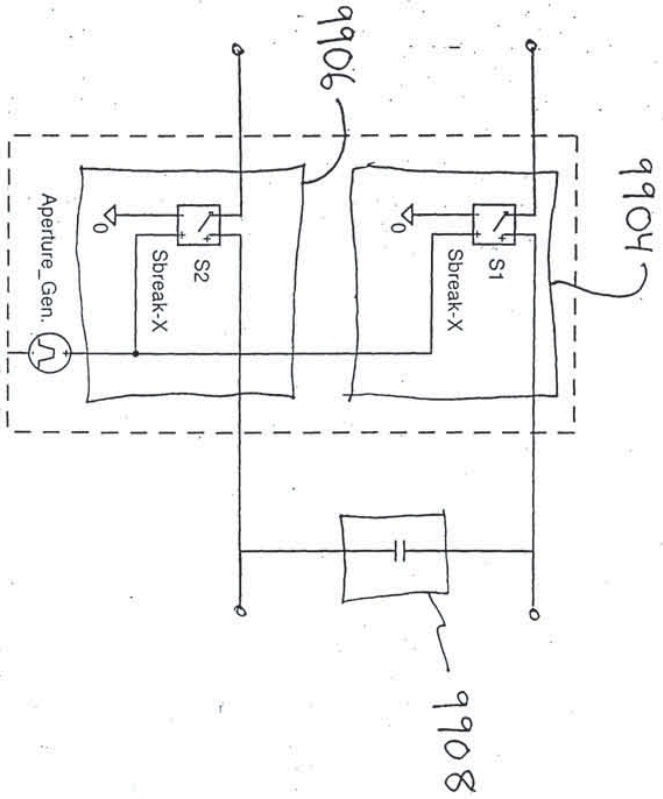


FIG 99

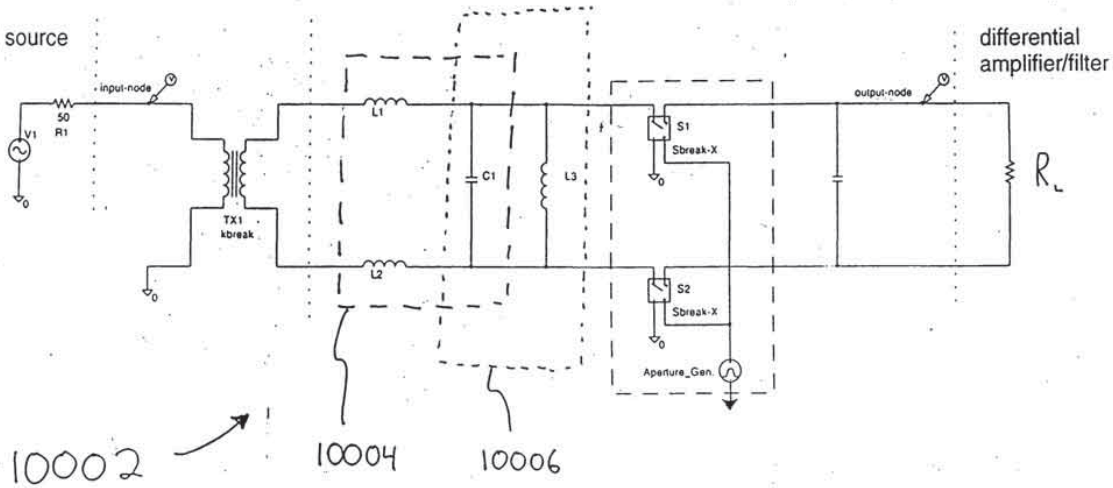


FIG. 100

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09521879.030900

PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG. 101

PRINT OF DRAWINGS
AS ORIGINALLY FILT

FIG. 102

PRINT OF DRAWINGS
AS ORIGINALLY FILE

CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-915M-5M-hieff.sch

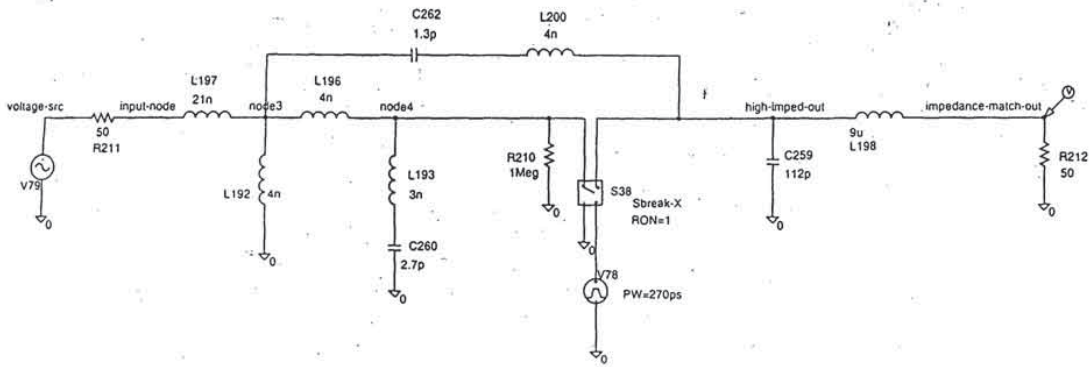
Fig. 103

PRINT OF DRAWINGS
AS ORIGINALLY FILI

CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-smaperture915M-5M-hieff.sch

Fig 104



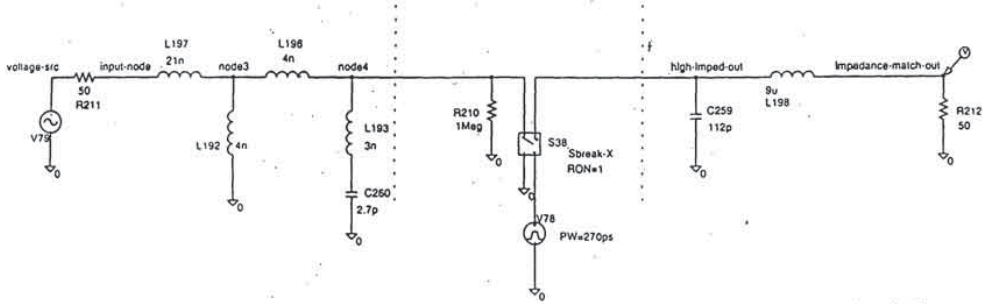
CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-bypass-915M-5M-hieff.sch

PRINT OF DRAWINGS
AS ORIGINALLY FILI

FIG 105

09521879.030900



CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-wobypass-915M-5M-hieff.sch

PRINT OF DRAWINGS
AS ORIGINALLY FILED

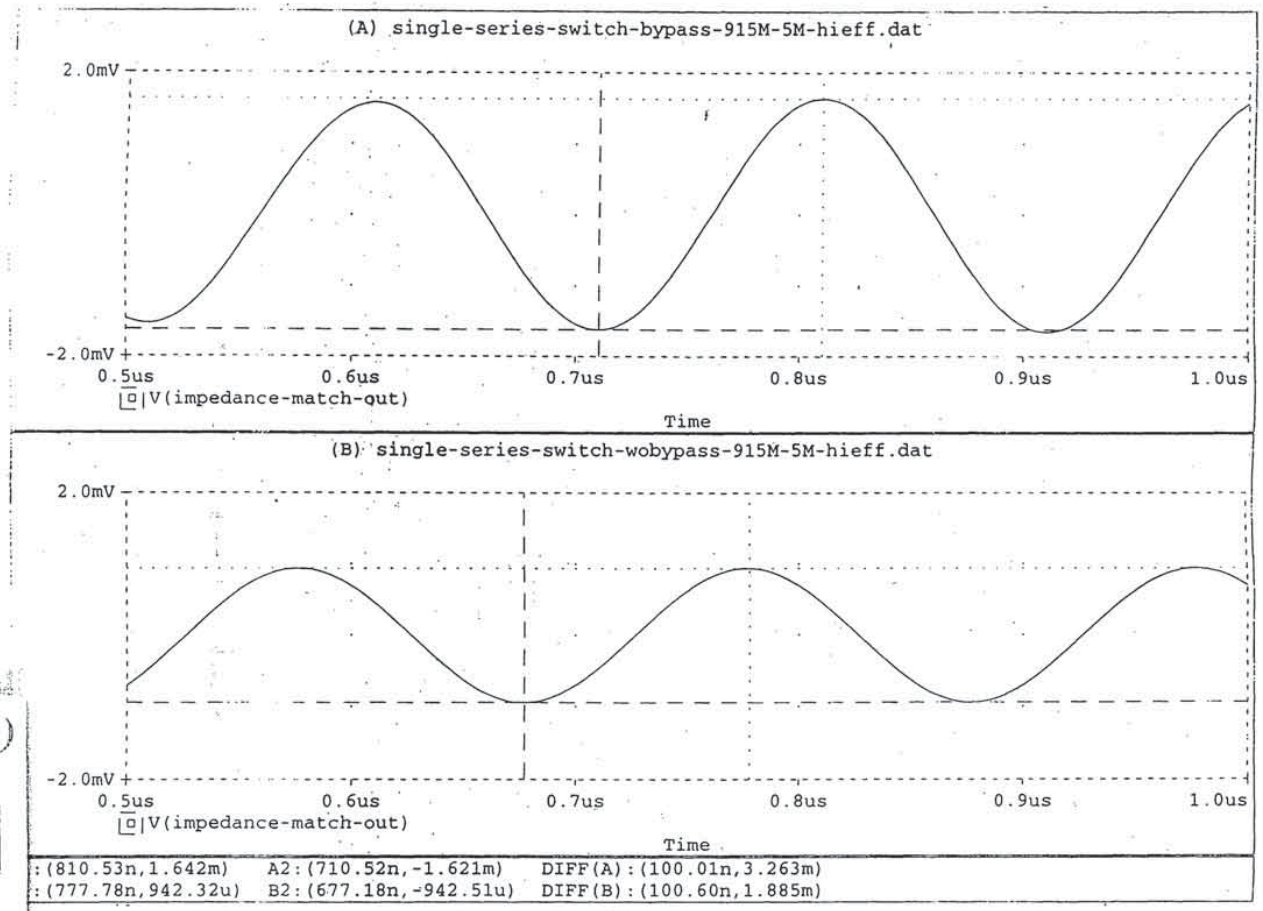
FIG 106

09521879.030900

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107A

107B



108 A

108 B

526

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521879.030900

PRINT OF DRAWINGS
AS ORIGINALLY FILE

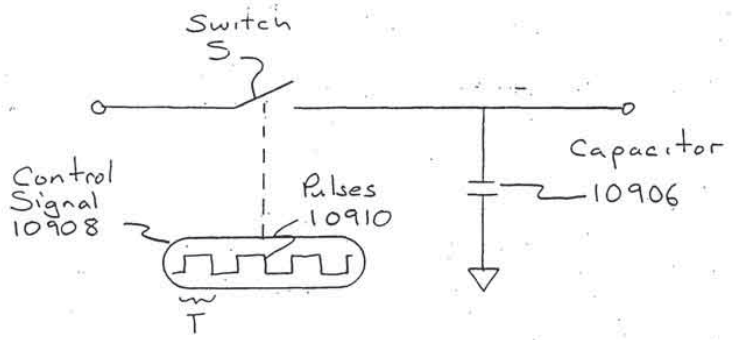


FIG. 109A

PRINT OF DRAWINGS
AS ORIGINALLY FILI

$$q = C \cdot V \qquad \text{EQ. 10}$$

$$V = A \cdot \sin(t) \qquad \text{EQ. 11}$$

$$q(t) = C \cdot A \cdot \sin(t) \qquad \text{EQ. 12}$$

$$\Delta q(t) = C \cdot A \cdot \sin(t) - C \cdot A \cdot \sin(t - T) \qquad \text{EQ. 13}$$

$$\Delta q(t) = C \cdot A \cdot (\sin(t) - \sin(t - T)) \qquad \text{EQ. 14}$$

$$\sin(\alpha) - \sin(\beta) = 2 \cdot \sin\left(\frac{\alpha - \beta}{2}\right) \cdot \cos\left(\frac{\alpha + \beta}{2}\right) \qquad \text{EQ. 15}$$

$$\Delta q(t) = 2 \cdot C \cdot A \cdot \sin\left[\frac{t - (t - T)}{2}\right] \cdot \cos\left[\frac{t + (t - T)}{2}\right] \qquad \text{EQ. 16}$$

$$\Delta q(t) = 2 \cdot C \cdot A \cdot \sin\left(\frac{1}{2} \cdot T\right) \cdot \cos\left(t - \frac{1}{2} \cdot T\right) \qquad \text{EQ. 17}$$

$$q(t) = \int_{\bullet}^{\bullet} C \cdot A \cdot (\sin(t) - \sin(t - T))\, dt \qquad \text{EQ. 18}$$

$$q(t) = -\cos(t) \cdot C \cdot A + \cos(t - T) \cdot C \cdot A \qquad \text{EQ. 19}$$

$$q(t) = C \cdot A \cdot (\cos(t - T) - \cos(t)) \qquad \text{EQ. 20}$$

FIG. 109B

PRINT OF DRAWINGS
AS ORIGINALLY FILI

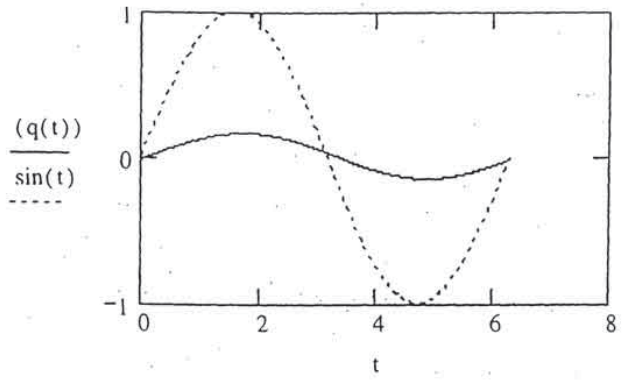
Graph 1

C=1;A=.5,T=¶

FIG. 10¶C

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AS ORIGINALLY FILE

For Graph 2: C=1, A=.5, T=π/10:



Graph 2

FIG. 109D

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Power - Charge Relationship

$$q = C \cdot V \qquad \text{EQ. 21}$$

$$V = \frac{q}{C} \qquad \text{EQ. 22}$$

$$V = \frac{J}{C} \qquad \text{EQ. 23}$$

$$J = \frac{q^2}{C} \qquad \text{EQ. 24}$$

$$P = \frac{J}{S} \qquad \text{EQ. 25}$$

$$P = \frac{q^2}{C \cdot S} \qquad \text{EQ. 26}$$

FIG. 109E

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Insertion Loss

Insertion loss in dB is expressed by:

$$ILdB = 10 \cdot \log \left(\frac{Pin}{Pout} \right)$$

or

$$ILdB = 10 \cdot \log \left[\frac{\left(\frac{Vin^2}{Rin} \right)}{\left(\frac{Vout^2}{Rout} \right)} \right]$$

FIG. 109F

PRINT OF DRAWINGS
AS ORIGINALLY FILE

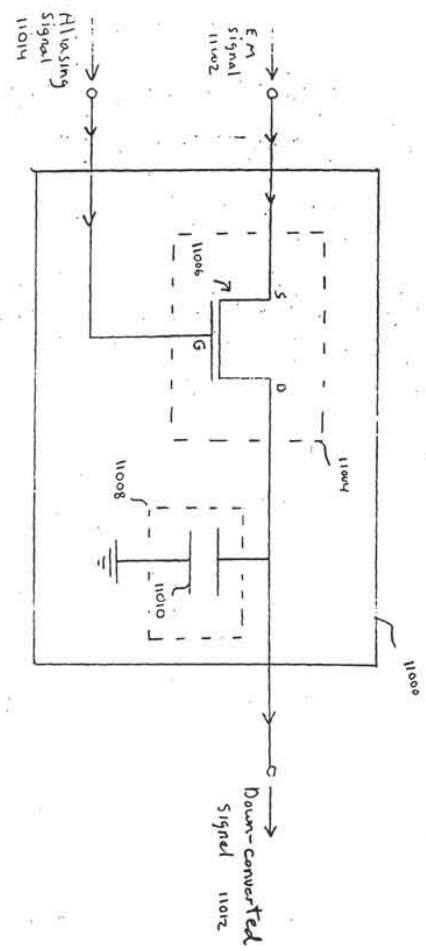


FIG 110A

PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG 1108

PRINT OF DRAWINGS
AS ORIGINALLY FILE

PRINT OF DRAWINGS
AS ORIGINALLY FILF

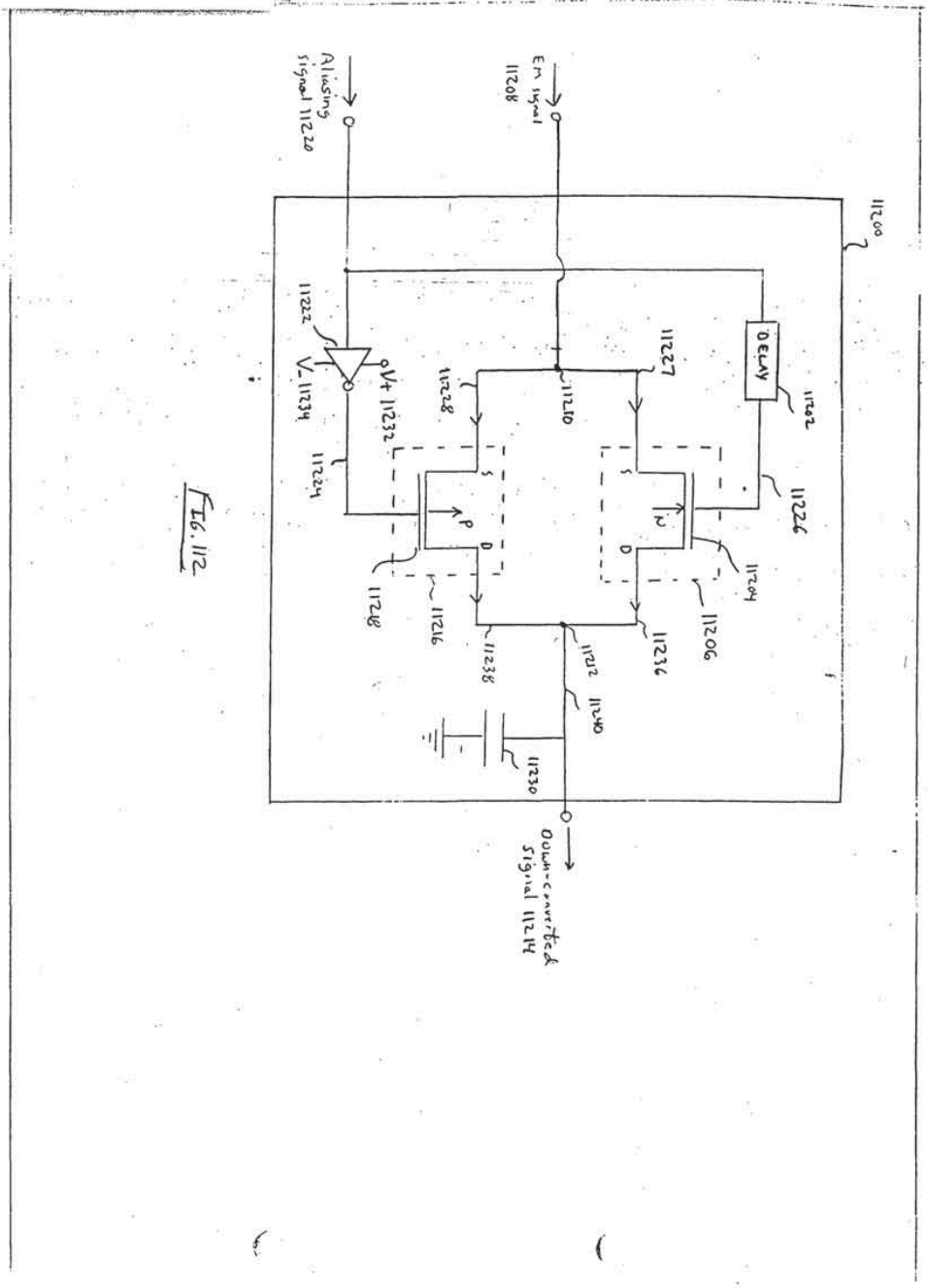


FIG. 11J

PRINT OF DRAWINGS
AS ORIGINALLY FILF

FIG. 113A

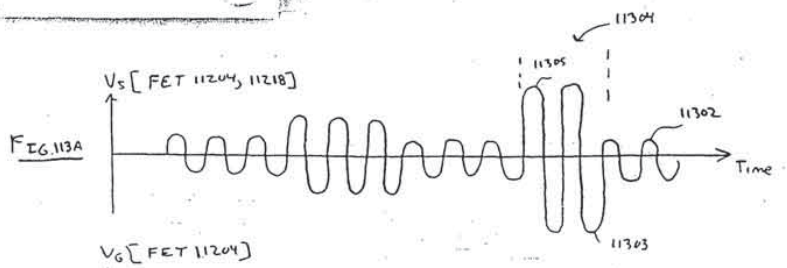


FIG. 113B

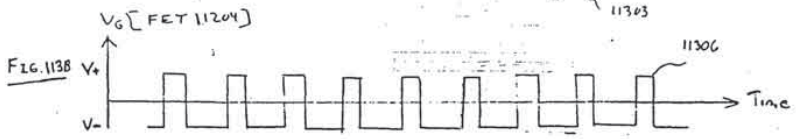


FIG. 113C

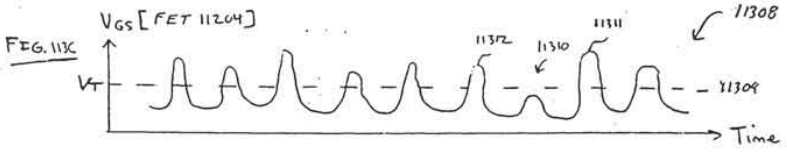


FIG. 113D

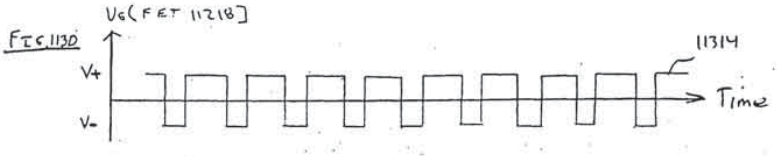
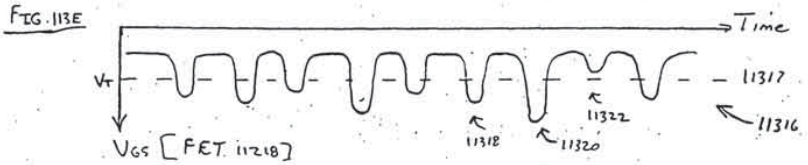


FIG. 113E



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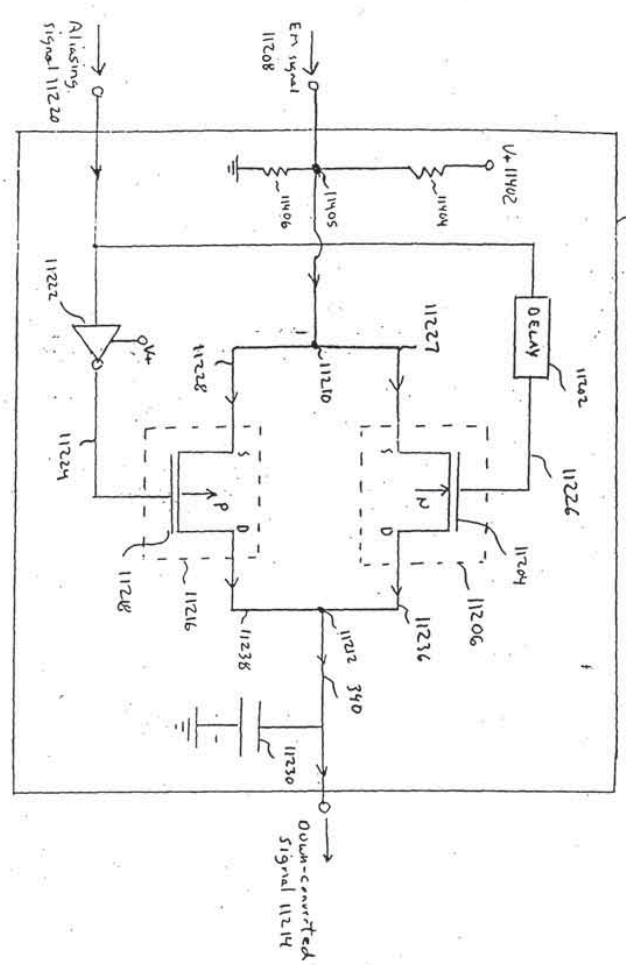


FIG. 11A

PRINT OF DRAWINGS
AS ORIGINALLY FILI

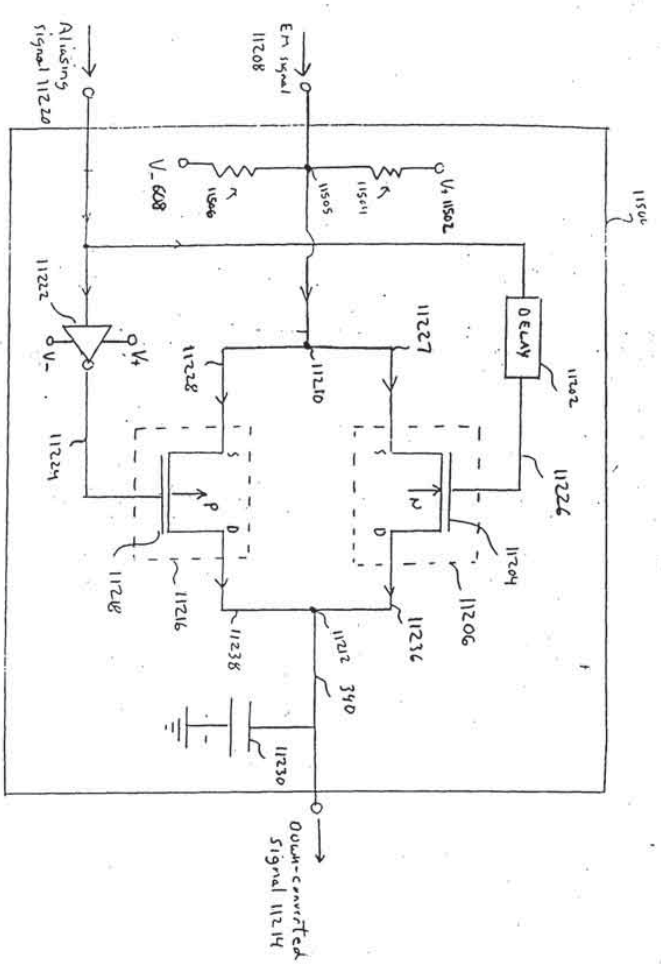


FIG. 11S

PRINT OF DRAWINGS
AS ORIGINALLY FILI

FIG. 116

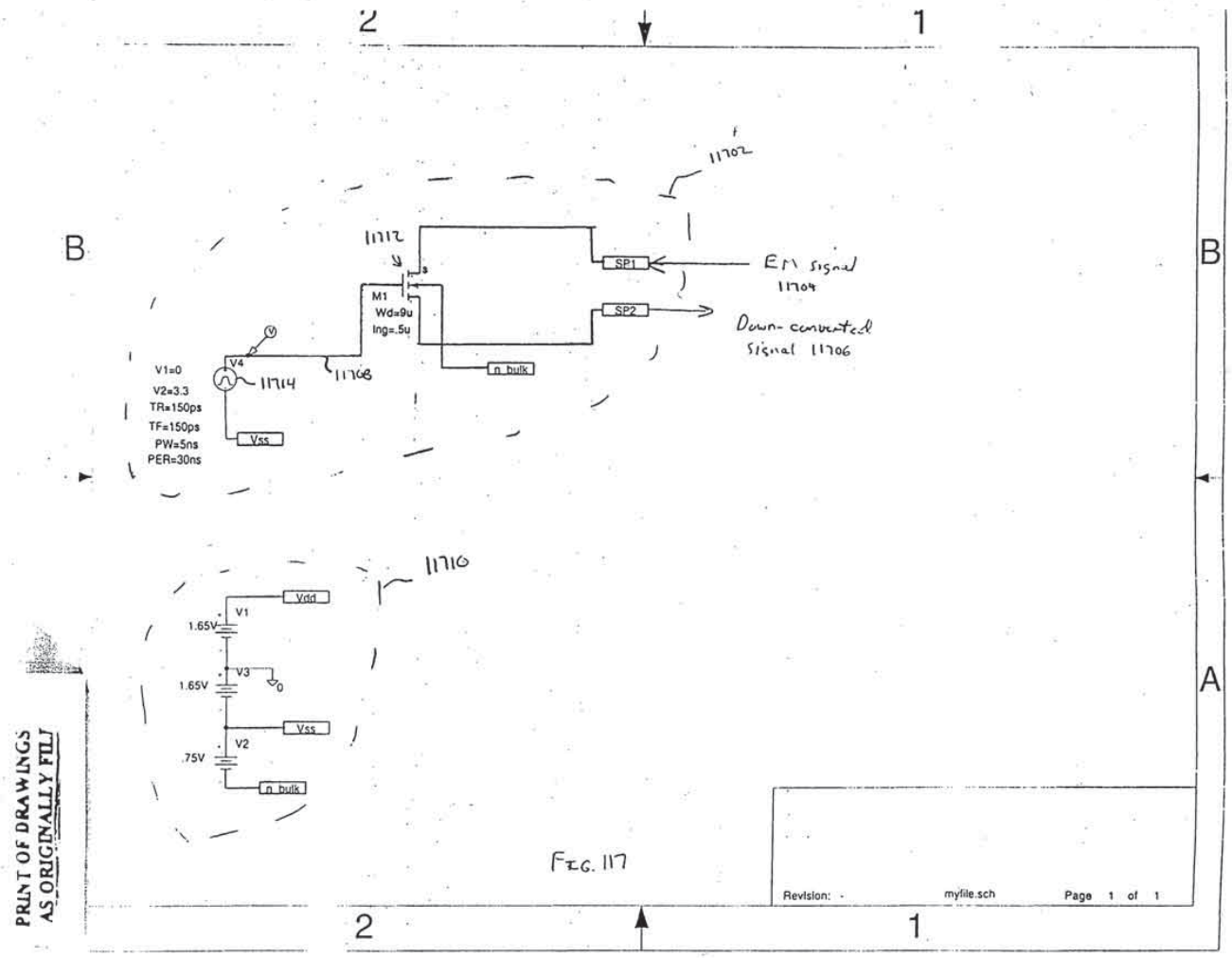


FIG. 117

PRINT OF DRAWINGS
AS ORIGINALLY FILI

09521979.020000

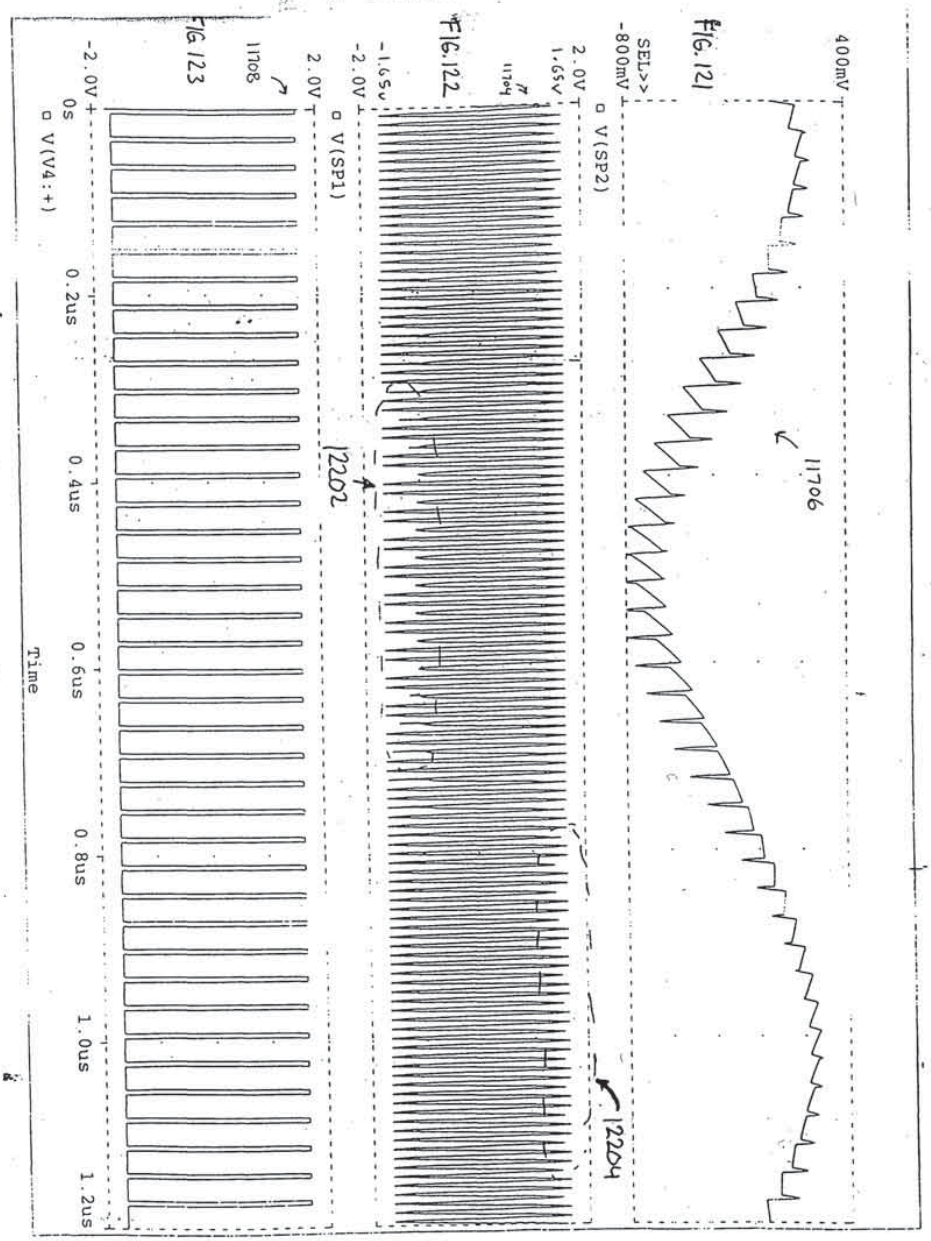
PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG. 118

FIG. 119

FIG. 120

PRINT OF DRAWINGS
AS ORIGINALLY FILF



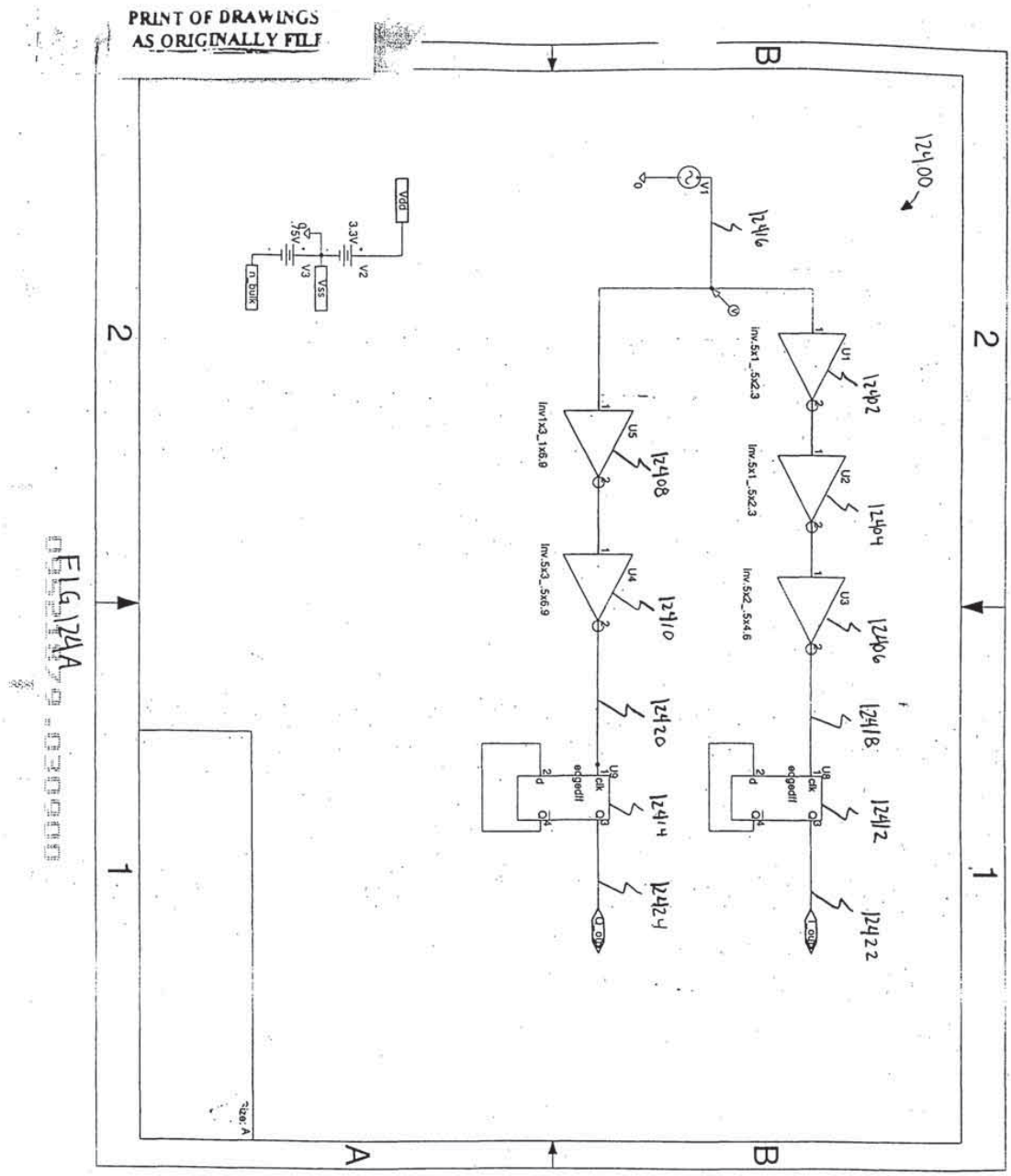

PRINT OF DRAWINGS
AS ORIGINALLY FILE
12400
12402
12404
12406
12408
12410
12412
12414
12416
12418
12420
12422
12424
VDD
VSS
3.3V
0.95V
V1
V2
V3
U1
U2
U3
U4
U5
U8
U9
inv.5x1_5x2.3
inv.5x2_5x4.6
inv1x3_1x6.9
inv.5x3_5x6.9
edgedff
clk
d
q
1 out
0 out
A
B
1
2

FIG. 12A

PRINT OF DRAWINGS
AS ORIGINALLY FILE

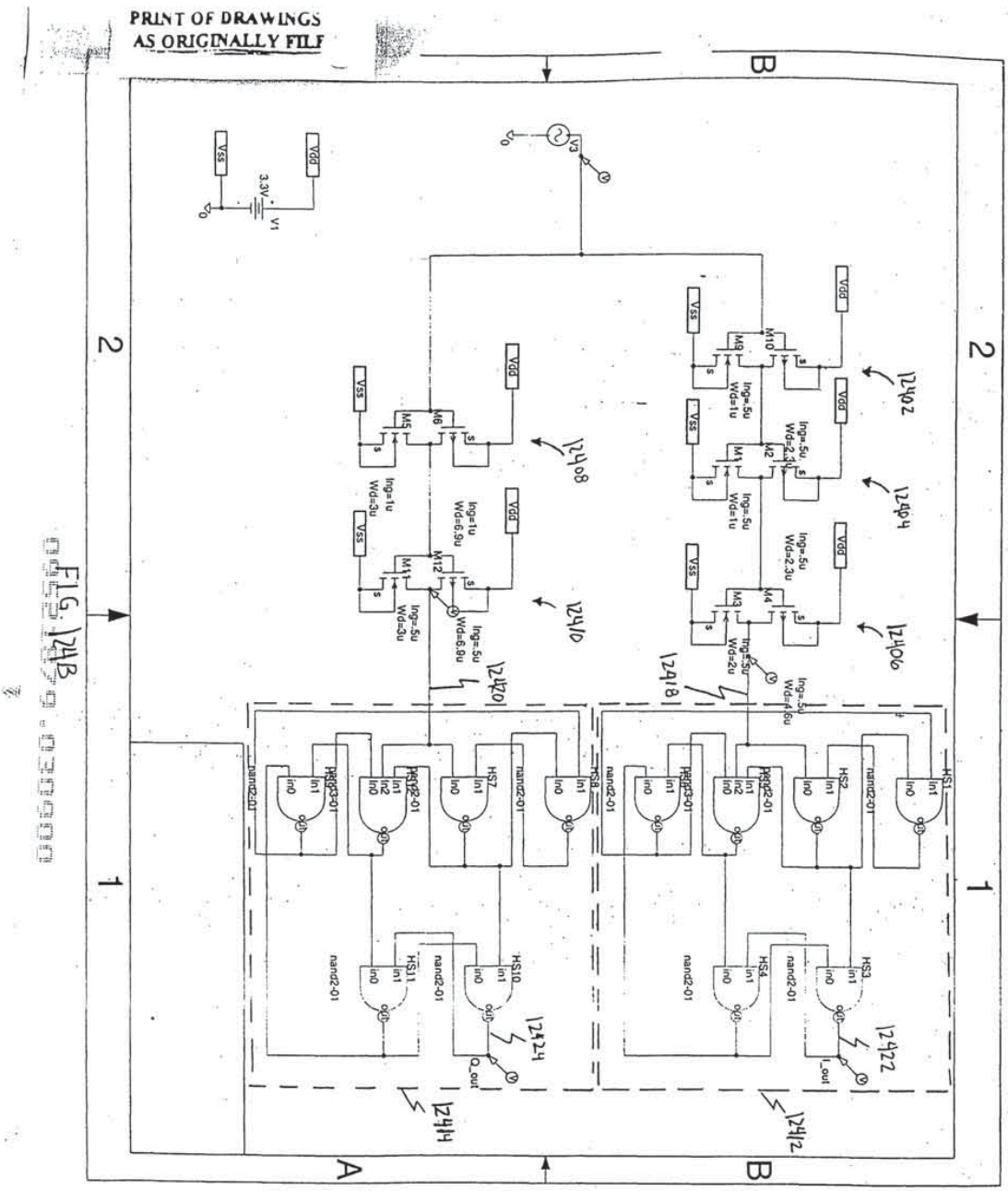


FIG. 12B

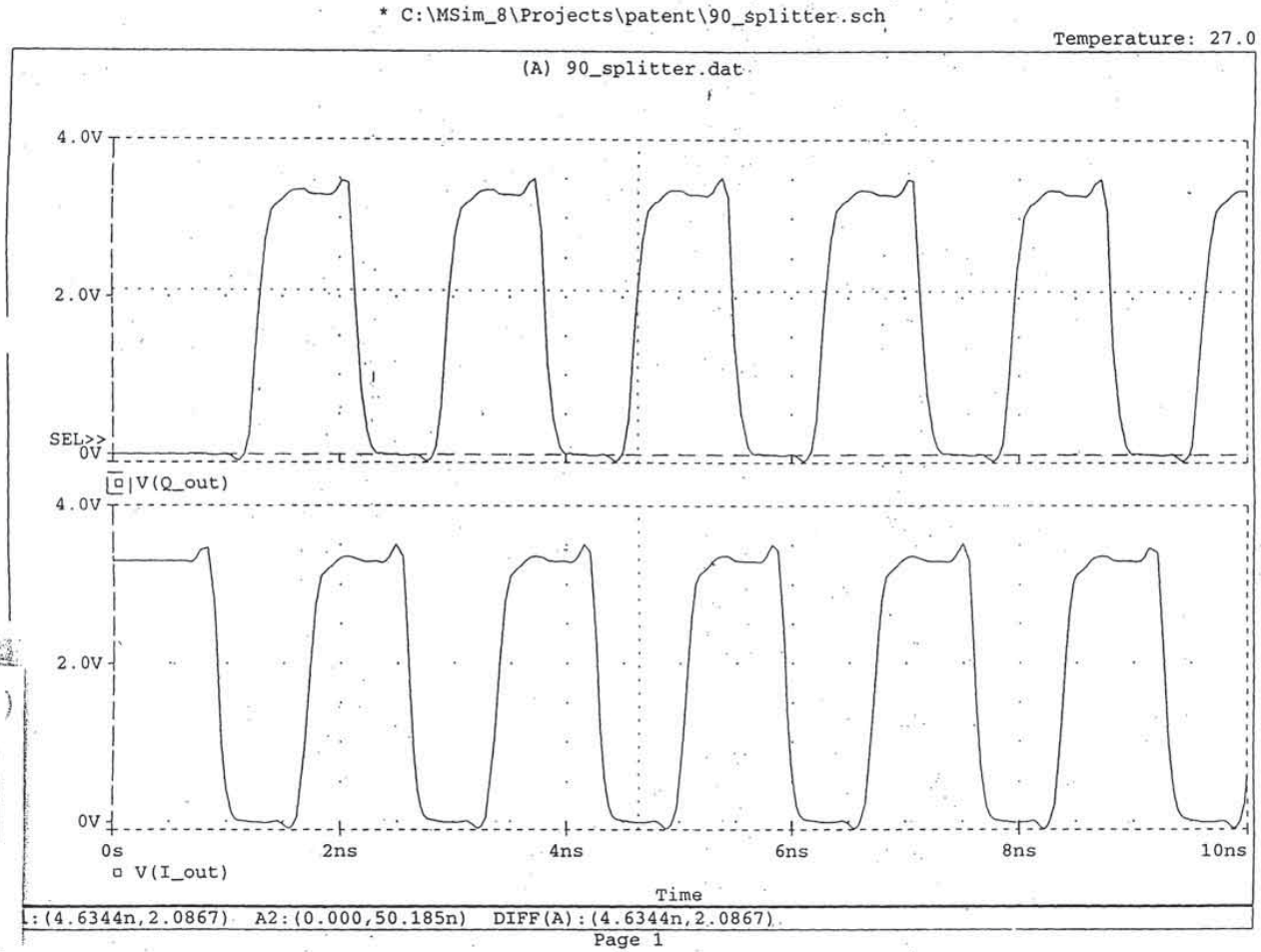


FIG. 12C

PRINT OF DRAWINGS AS ORIGINALLY FILED

546

09521879.030900

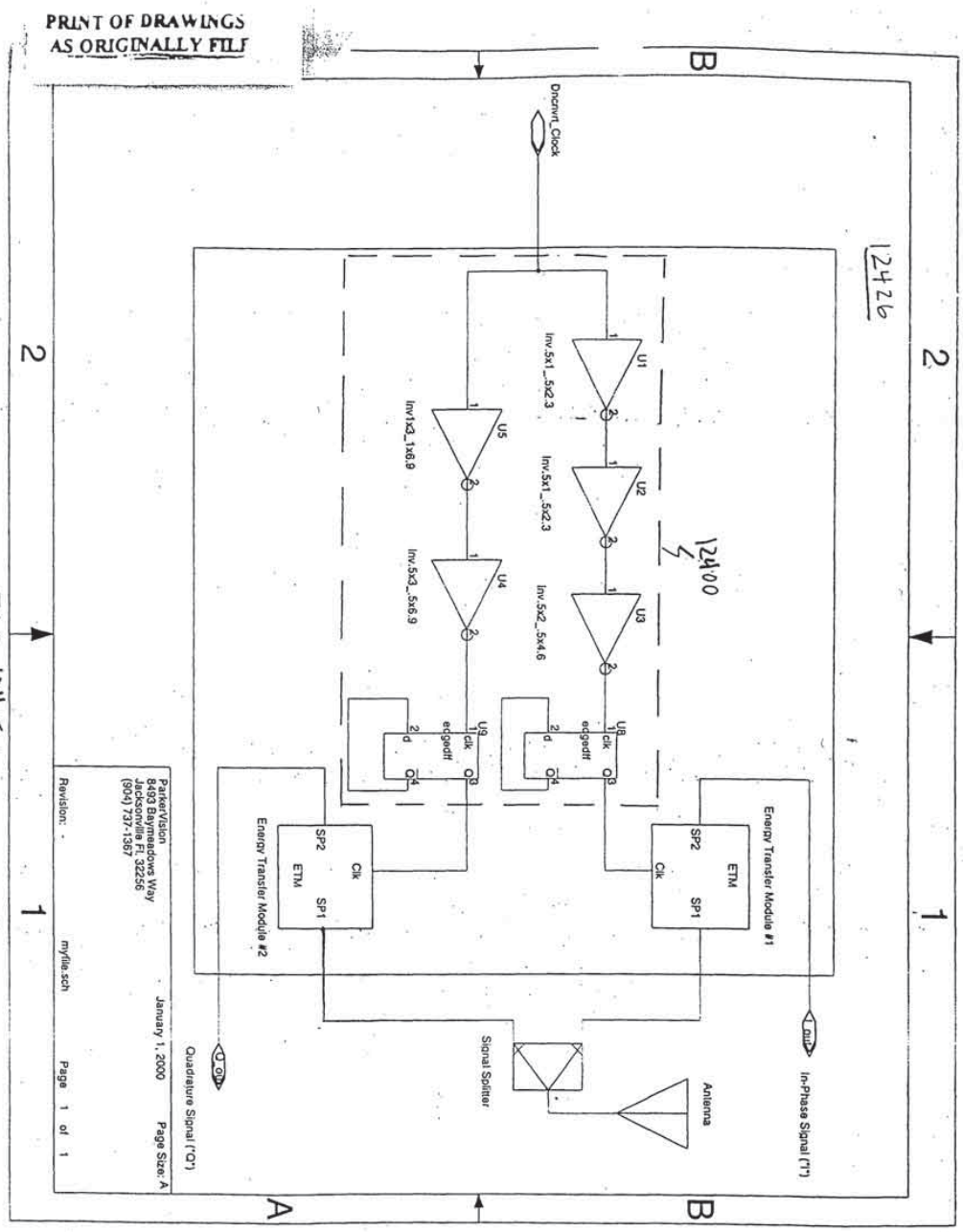
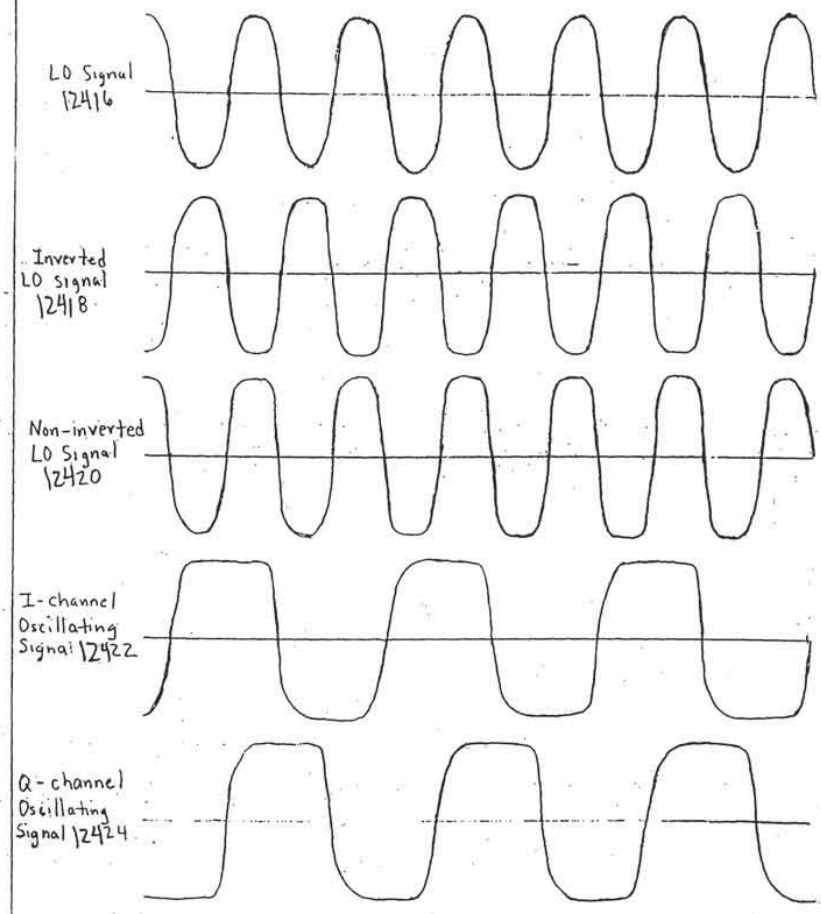

PRINT OF DRAWINGS
AS ORIGINALLY FILE
12426
12400
Dnconvt_Clock
U1
Inv.5x1_5x2.3
U2
Inv.5x1_5x2.3
U3
Inv.5x2_5x4.6
U4
Inv.5x3_5x6.9
U5
Inv1x3_1x6.9
U8
clk
edgedff
U9
clk
edgedff
Energy Transfer Module #1
SP2
ETM
SP1
Clk
Energy Transfer Module #2
SP2
Clk
ETM
SP1
Signal Splitter
Antenna
In-Phase Signal ("I")
Quadrature Signal ("Q")
Parker/Vision
8493 Baymeadows Way
Jacksonville FL 32256
(904) 737-1367
January 1, 2000
Page Size: A
Revision: -
myfile.sch
Page 1 of 1

FIG. 12A

PRINT OF DRAWINGS
AS ORIGINALLY FILE



No. 5505 Engineer's Computation Pad
AMPI

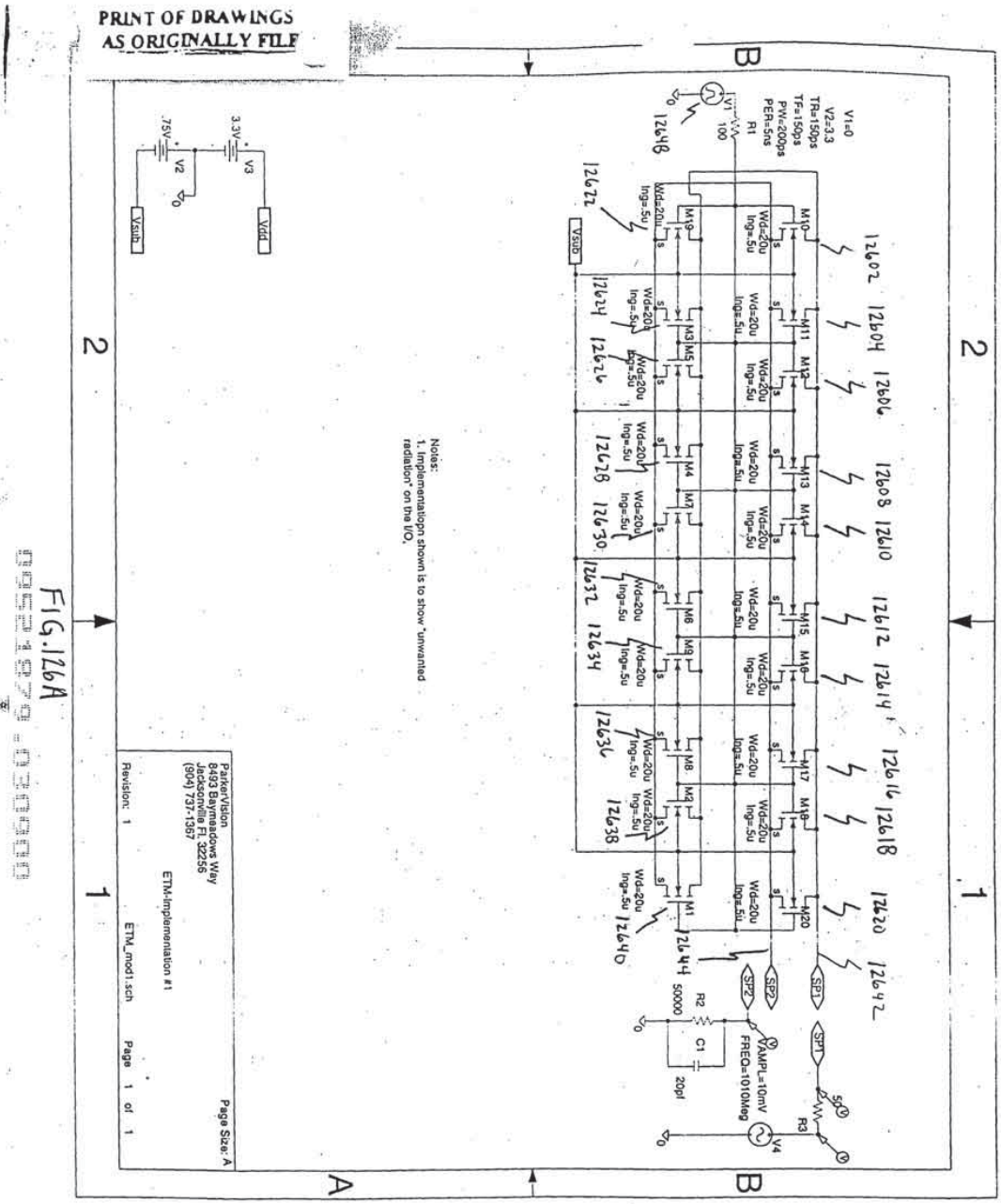
PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG. 125

1604, 8710

DOCKET-DESIGN

Engineer's Compilation Pad


PRINT OF DRAWINGS
AS ORIGINALLY FILE
12602 12604 12606 12608 12610 12612 12614 12616 12618 12620 12622
12624 12626 12628 12630 12632 12634 12636 12638 12640 12642 12644 12646 12648
V1=0
V2=3.3
TR=150ps
TF=150ps
PW=200ps
PER=5ns
R1
100
R2
50000
C1
20pf
R3
50
V1
V2
V3
V4
3.3V
.75V
Vdd
Vsub
FREQ=1010Meg
AMPL=10mV
SP1
SP2
SP3
Wd=20u
lng=5u
Notes:
1. Implemenation shown is to show "unwanted radiation" on the I/O.
ParkerVision
8493 Baymeadows Way
Jacksonville FL 32256
(904) 737-1367
ETM-Implementation #1
Revision: 1
ETM_mod1.sch
Page 1 of 1
Page Size: A
FIG.126A

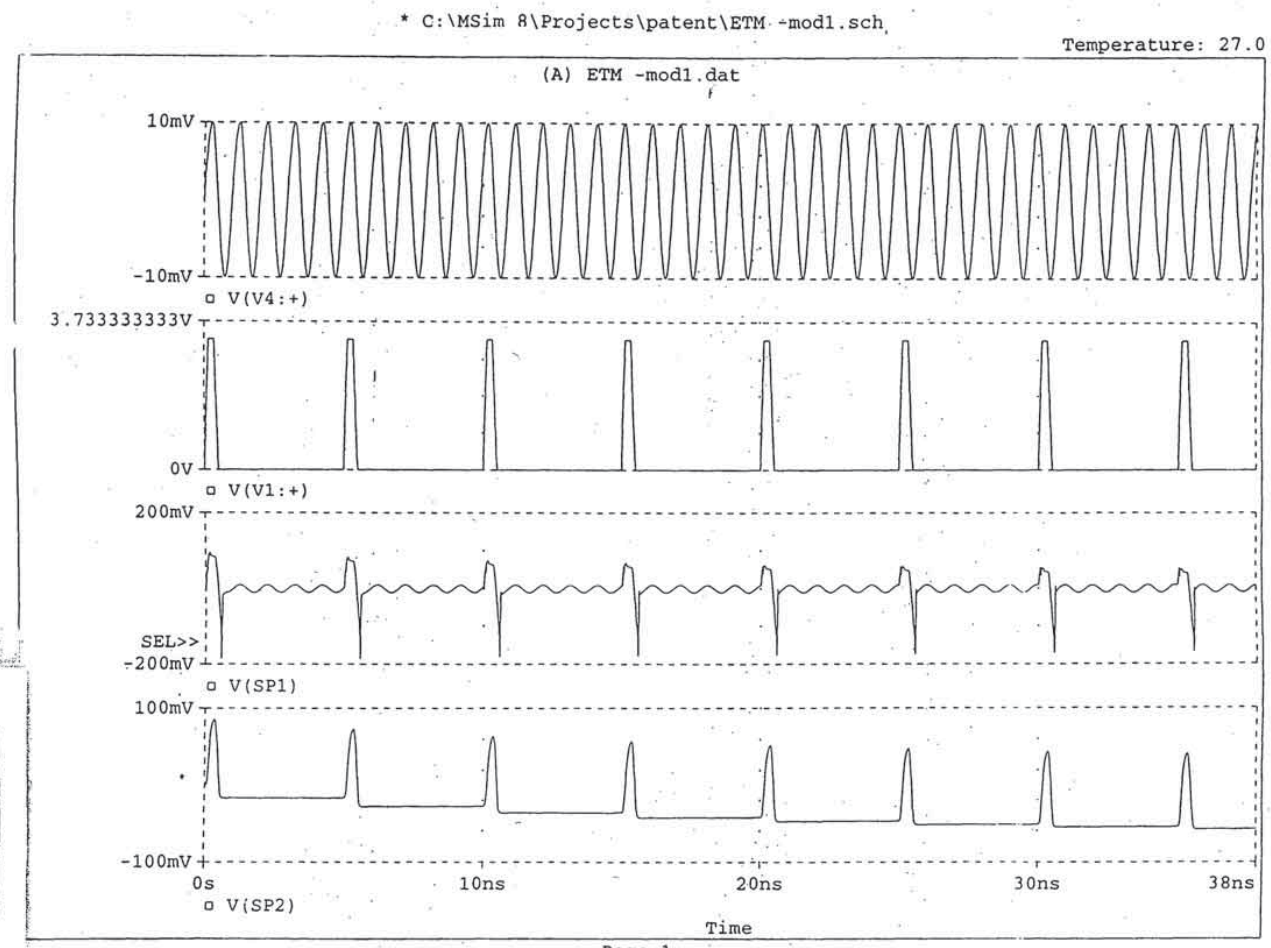


FIG 126B

FIG. 126C

FIG. 126D

PRINT OF DRAWINGS AS ORIGINALLY FILF

09521979_030900

551

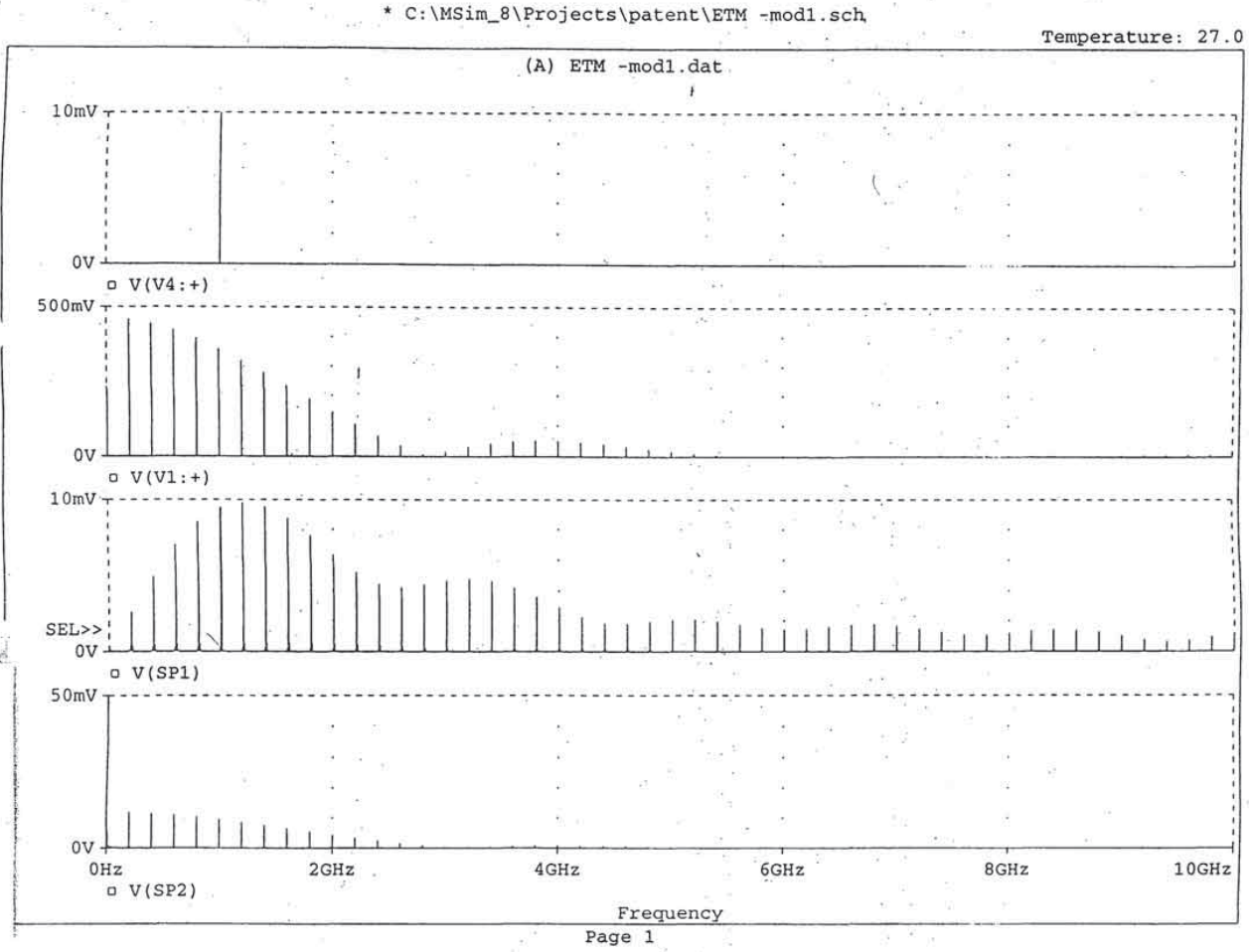


FIG 12.6 F

FIG. 12.6 G

FIG 12.6 H

PRINT OF DRAWINGS AS ORIGINALLY FILF

09521879.030900

552

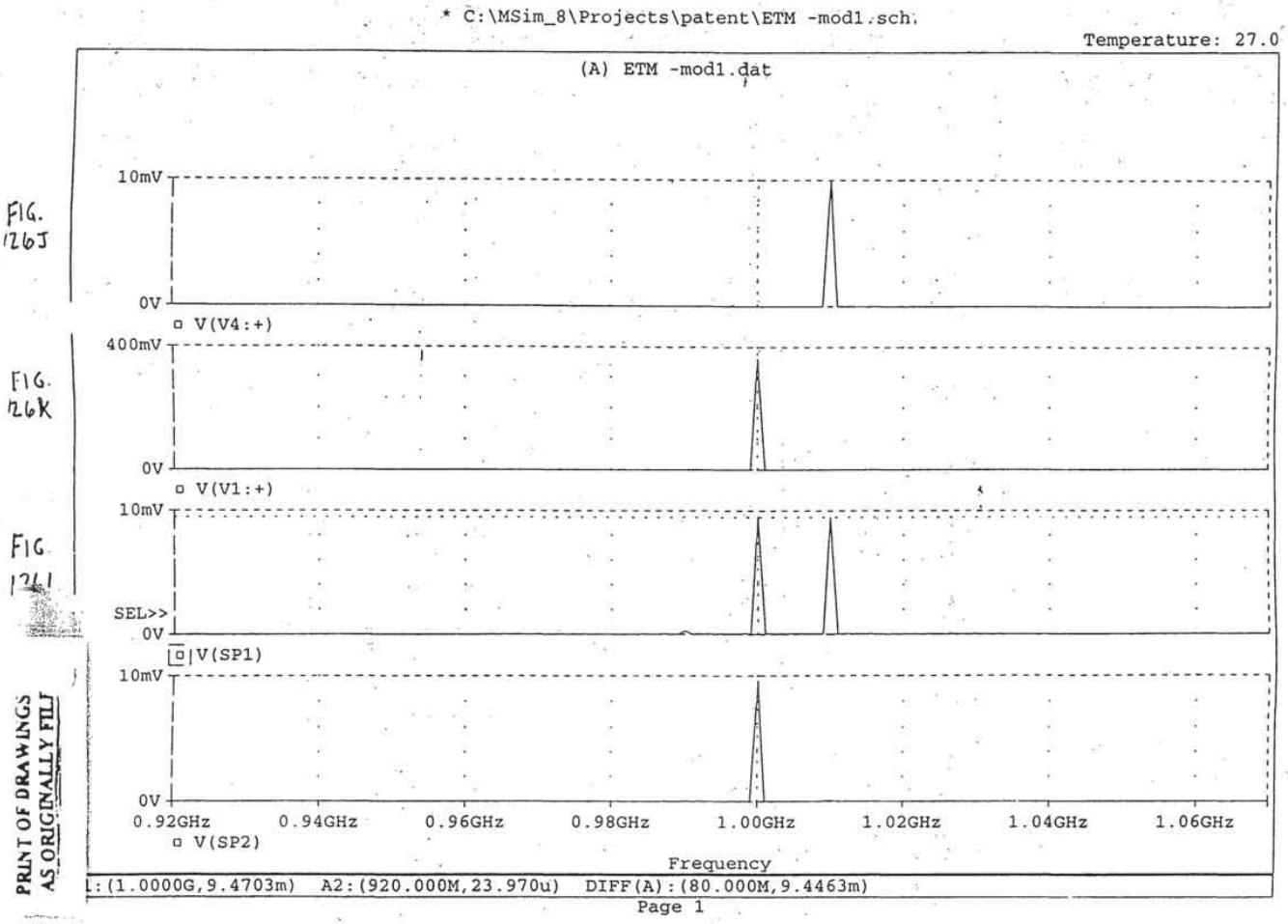


FIG. 126J

FIG. 126K

FIG. 126L

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521979.030900

553

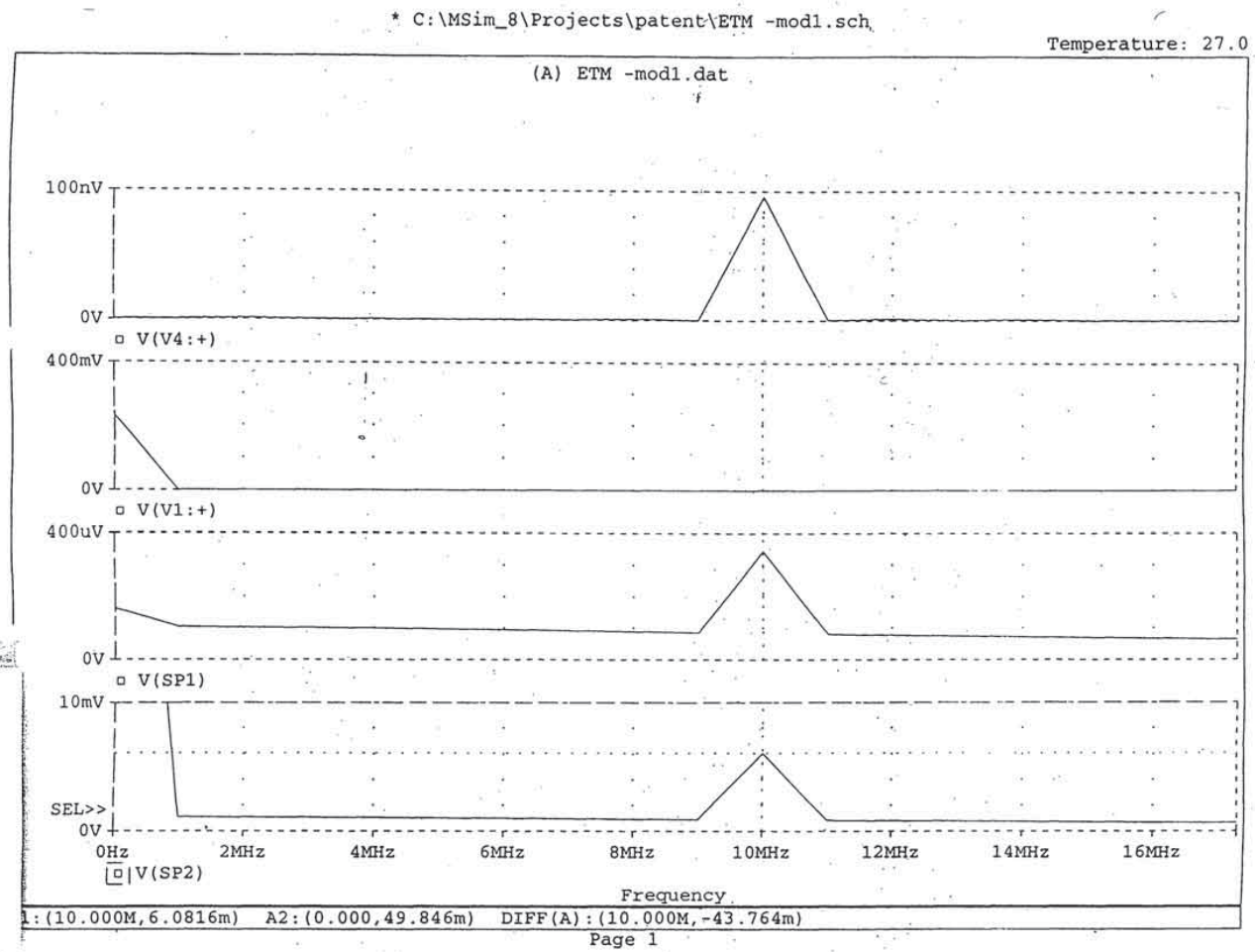


FIG 126N

FIG 126O

FIG 126P

PRINT OF DRAWINGS AS ORIGINALLY FILE

554

09521879.030900

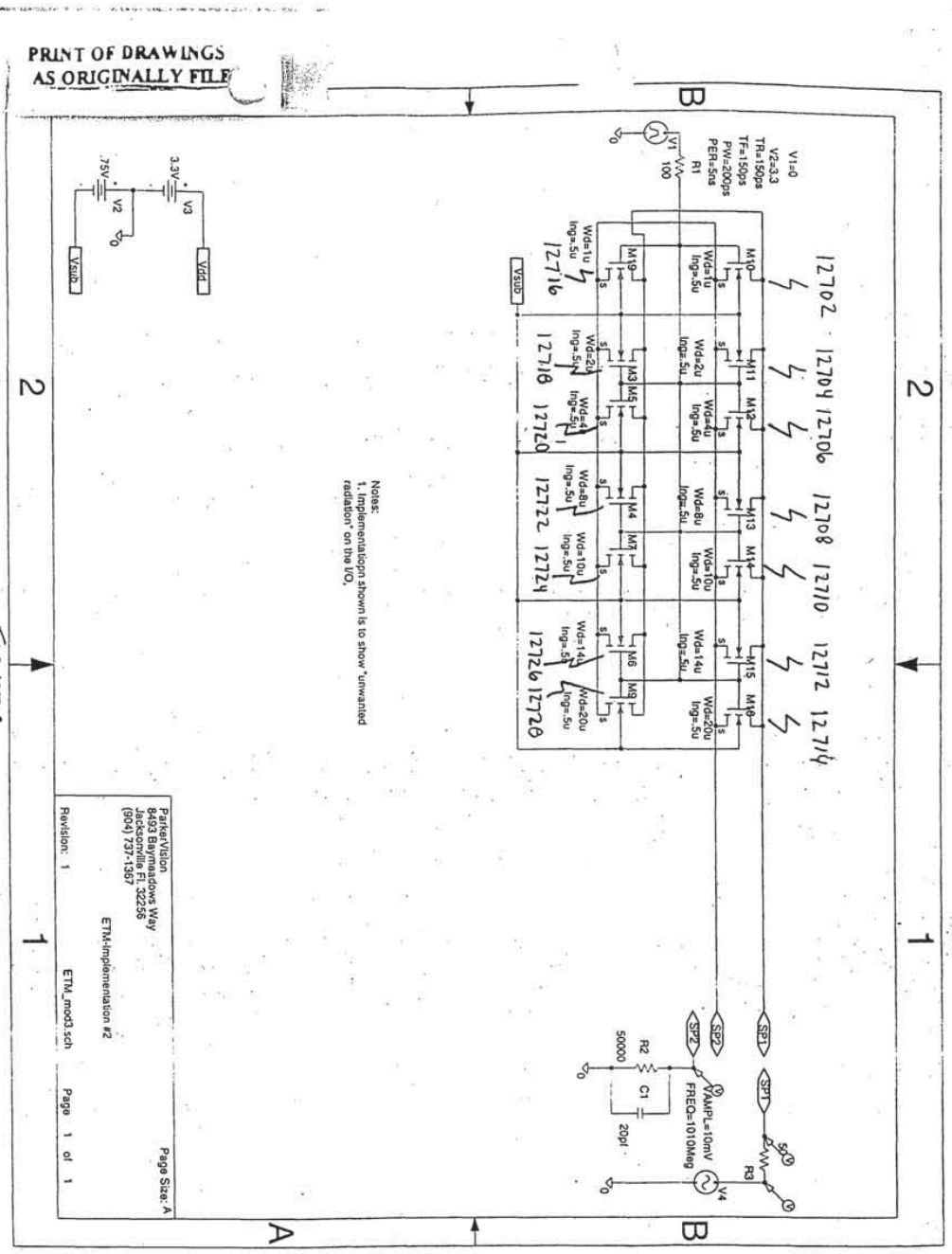

PRINT OF DRAWINGS
AS ORIGINALLY FILE
12702
12704
12706
12708
12710
12712
12714
12716
12718
12720
12722
12724
12726
12728
V1=0
V2=3.3
TR=150ps
TF=150ps
PW=200ps
PER=5ns
R1
100
M10
M11
M12
M13
M14
M15
M16
M19
M3
M5
M4
M7
M6
M9
Wd=1u
Wd=2u
Wd=4u
Wd=8u
Wd=10u
Wd=14u
Wd=20u
lng=.5u
VSUB
SP1
SP2
R2
50000
C1
20pf
FREQ=1010Meg
V4
R3
50
V1
100
3.3V
V3
Vdd
2.5V
V2
Vsub
Notes:
1. Implementation shown is to show "unwanted radiation" on the I/O.
ParkerVision
8493 Baymeadows Way
Jacksonville, FL
(904) 737-1367
ETM-Implementation #2
Revision: 1
ETM_mod3.sch
Page 1 of 1
Page Size: A

FIG.127A

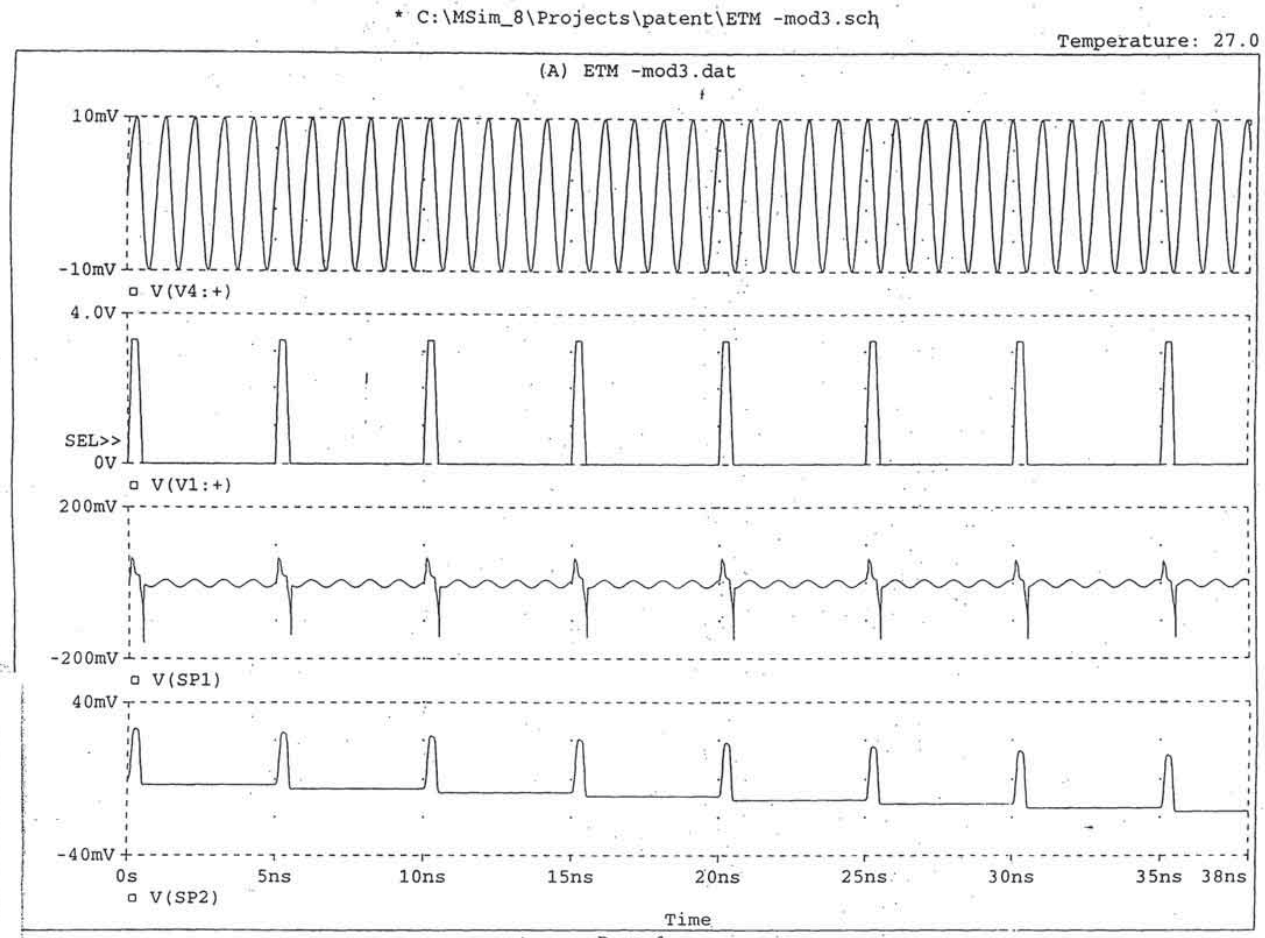


FIG. 127B

FIG. 127C

FIG. 127D

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521879.030900

556

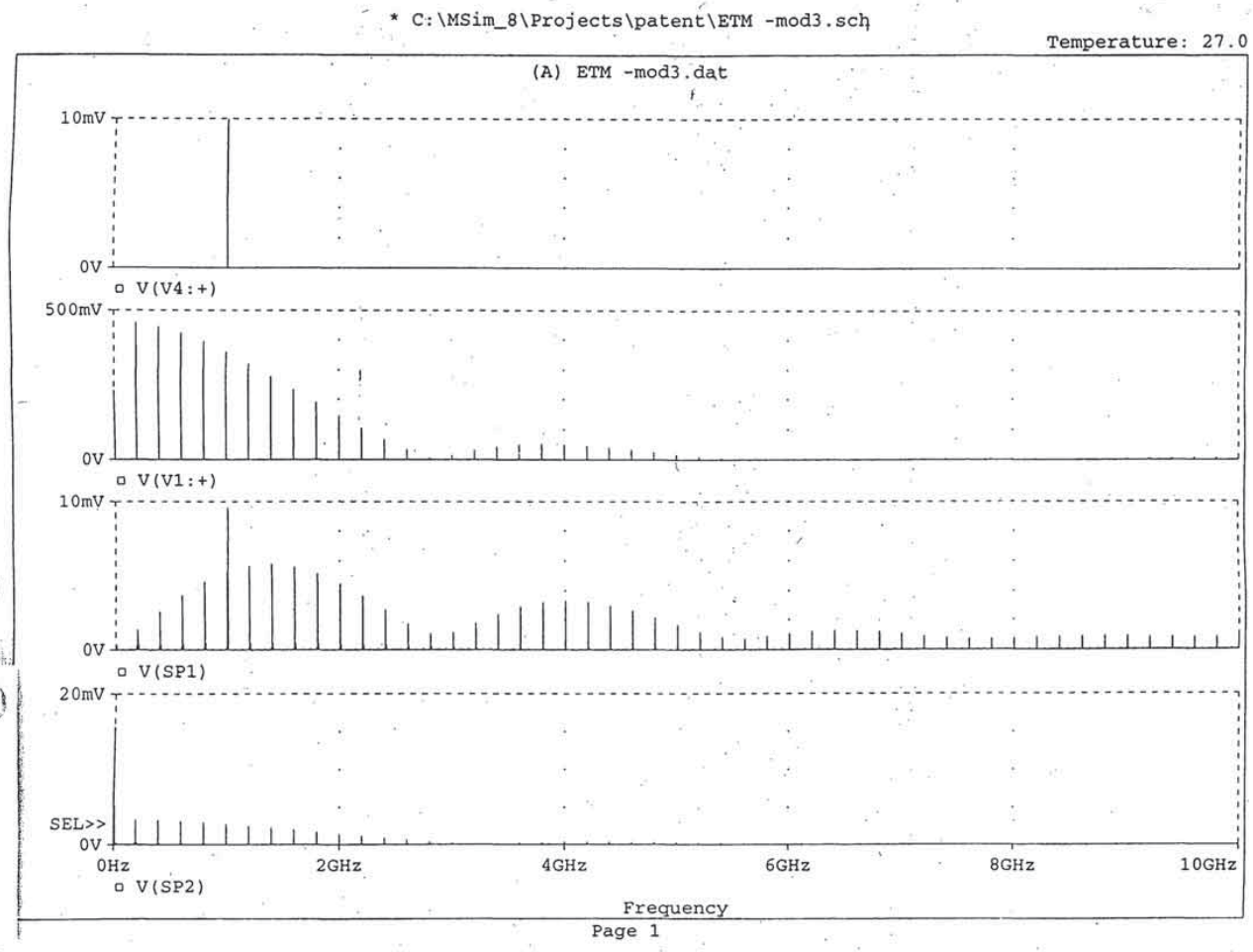


FIG. 127F

FIG. 127G

FIG. 127H

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521879.030000

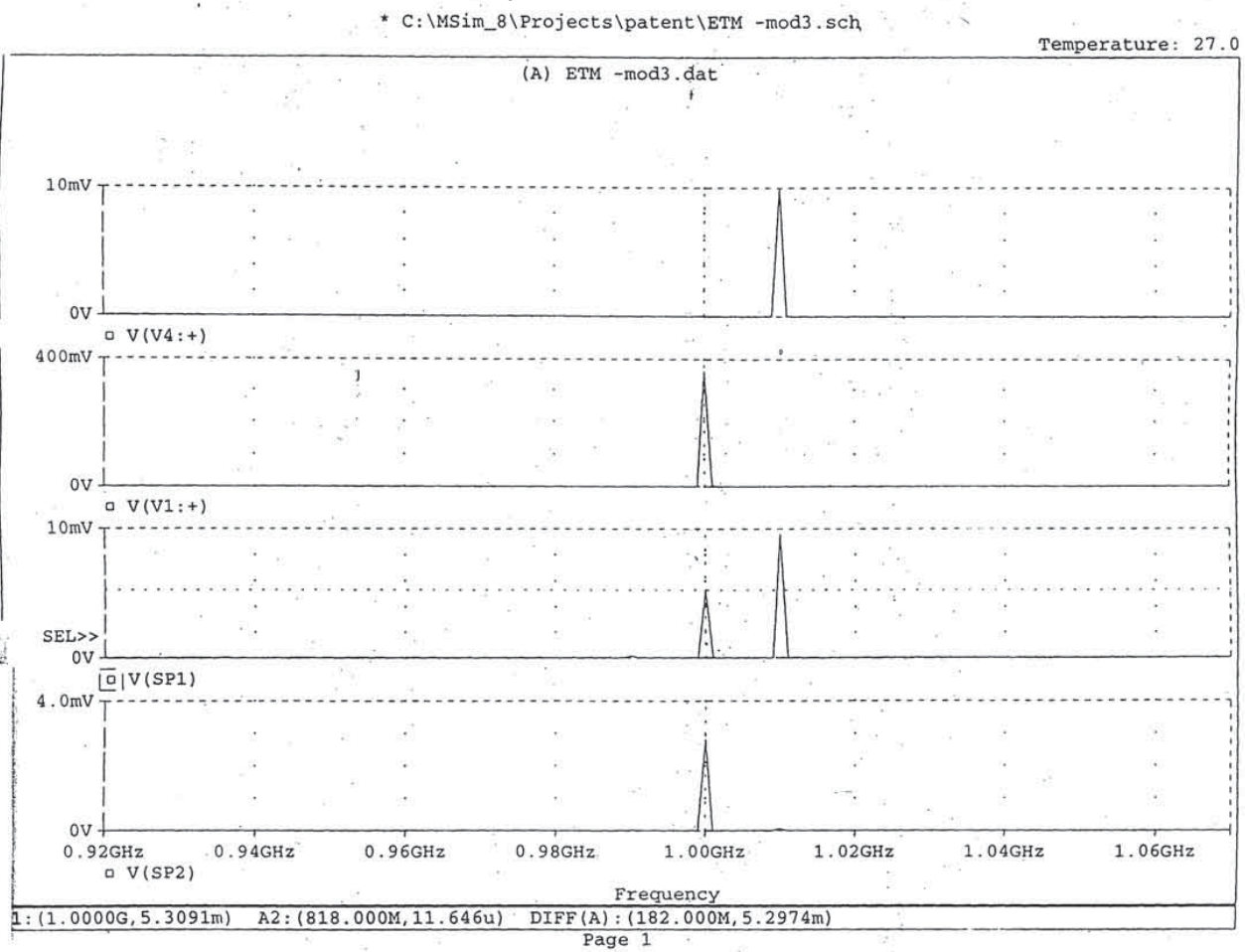


FIG 127J

FIG. 127K

FIG 127L

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521879.030900

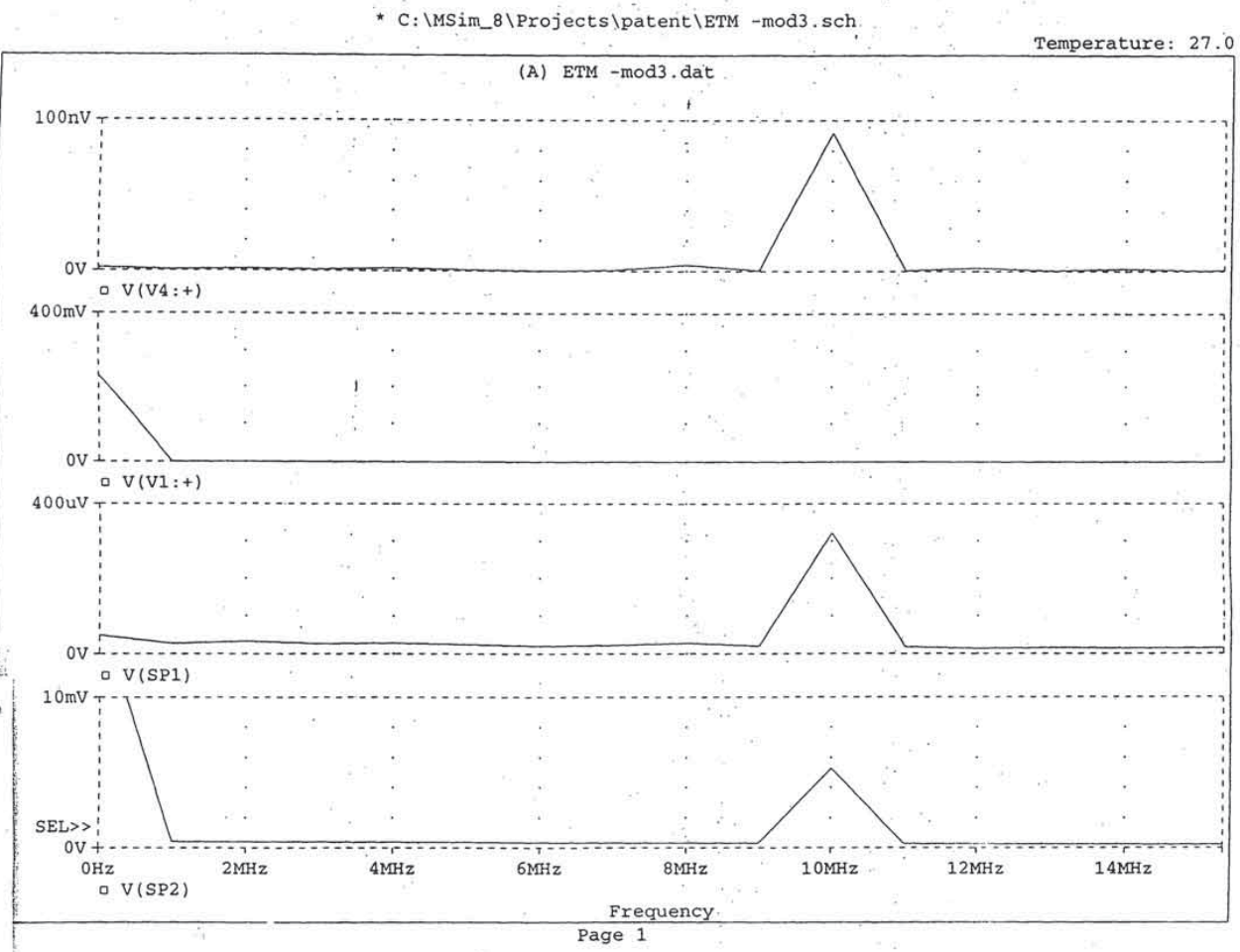


FIG. 127N

FIG. 127O

FIG. 127P

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521879_020900

PRINT OF DRAWINGS
AS ORIGINALLY FILED

No. 5505
Engineer's Computation Pad

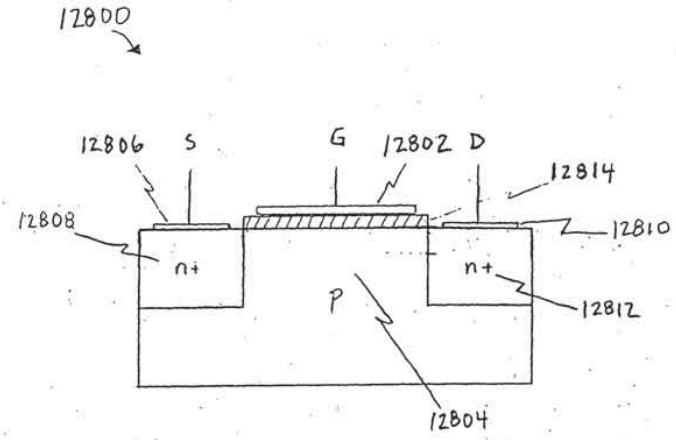


FIG. 128A

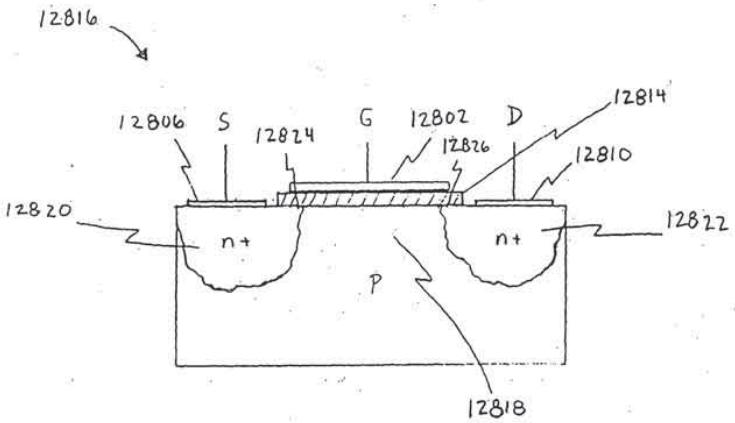


FIG. 128B

PRINT OF DRAWINGS
AS ORIGINALLY FILF

FIG. 12B C

No. 5505
Engineer's Computation Paid

PRINT OF DRAWINGS
AS ORIGINALLY FILI

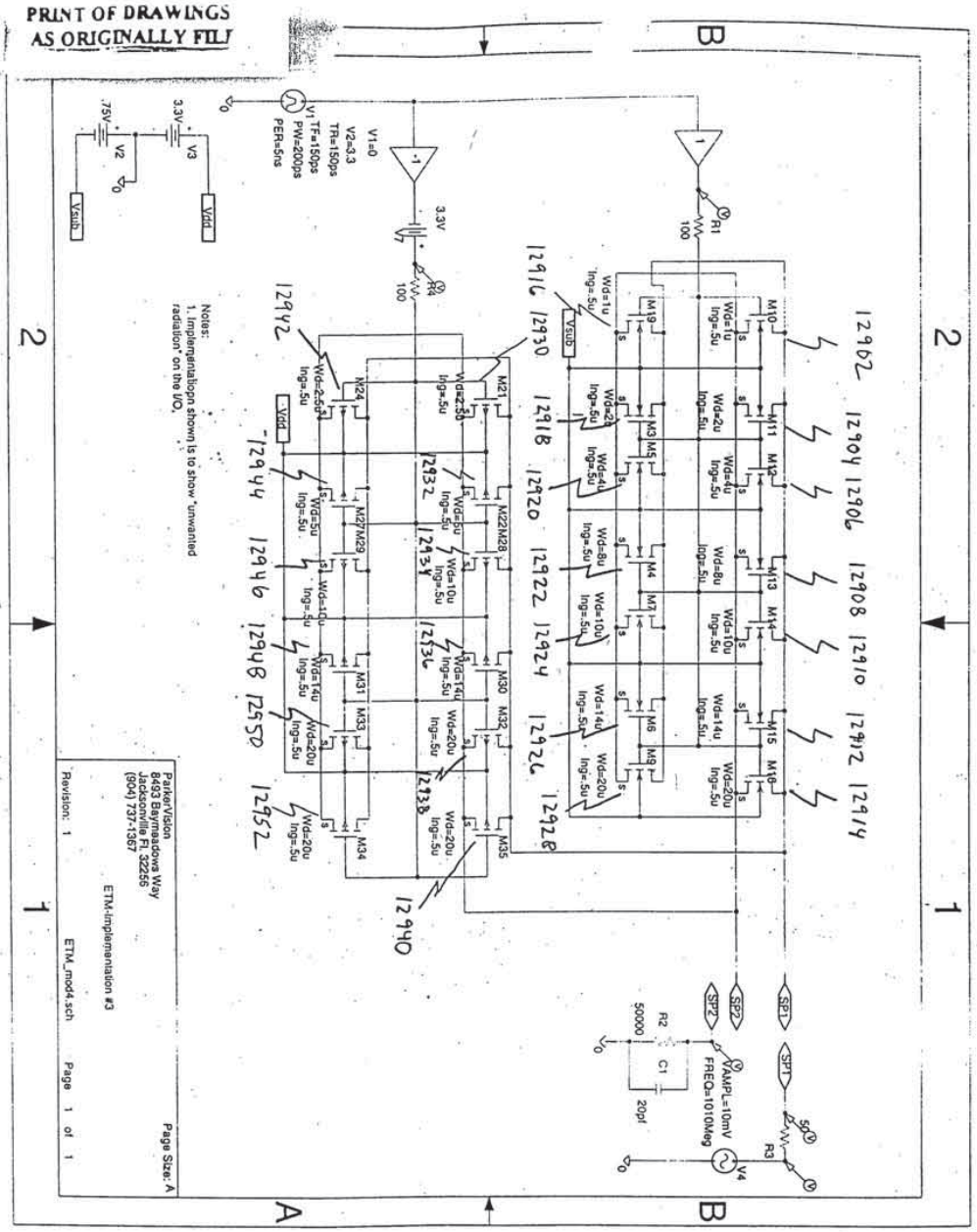


FIG. 129A

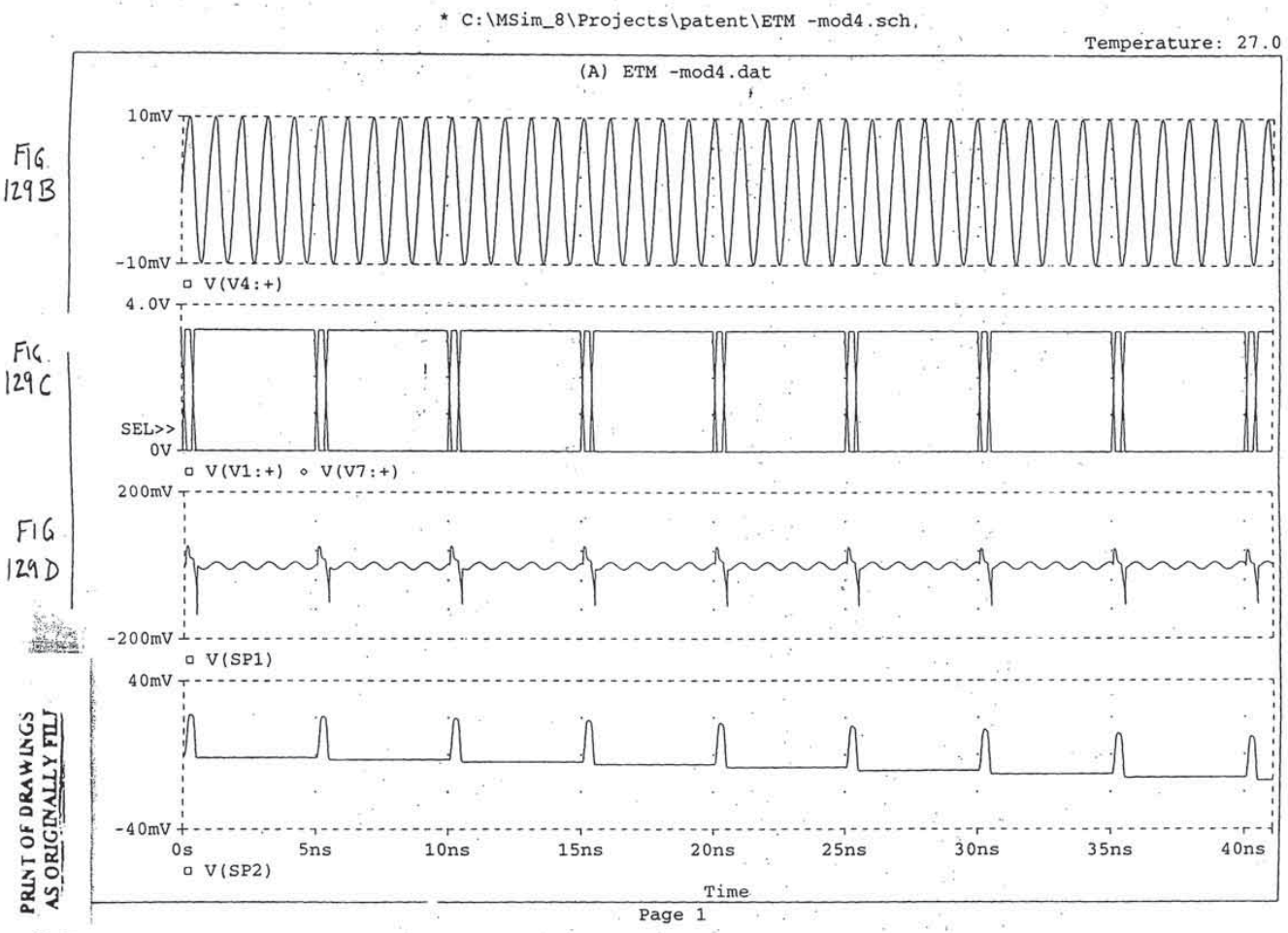


FIG 129B

FIG 129C

FIG 129D

PRINT OF DRAWINGS AS ORIGINALLY FILED

09521879.030900

563

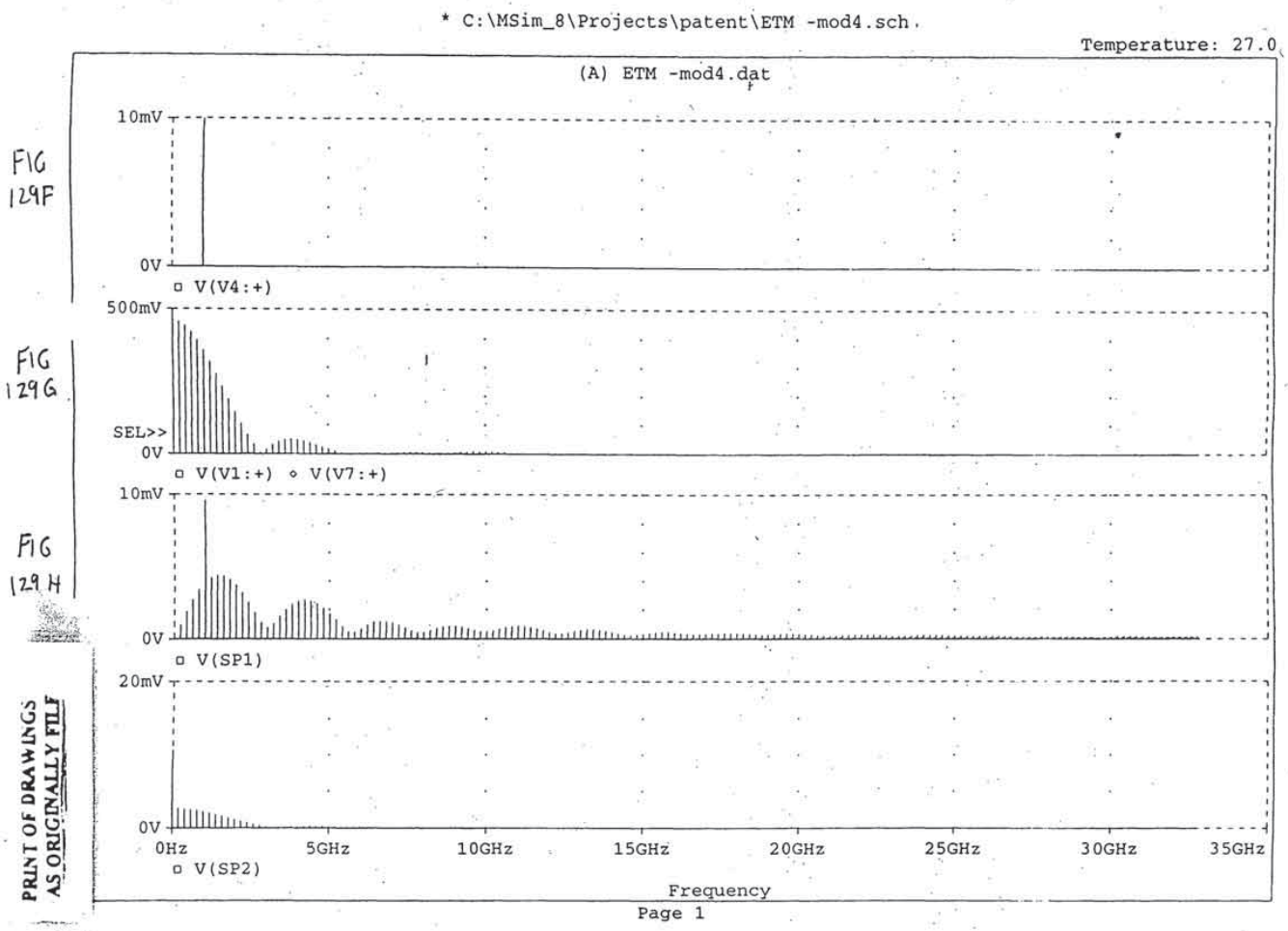


FIG 129F

FIG 129G

FIG 129H

PRINT OF DRAWINGS AS ORIGINALLY FILF

09521879.030000

564

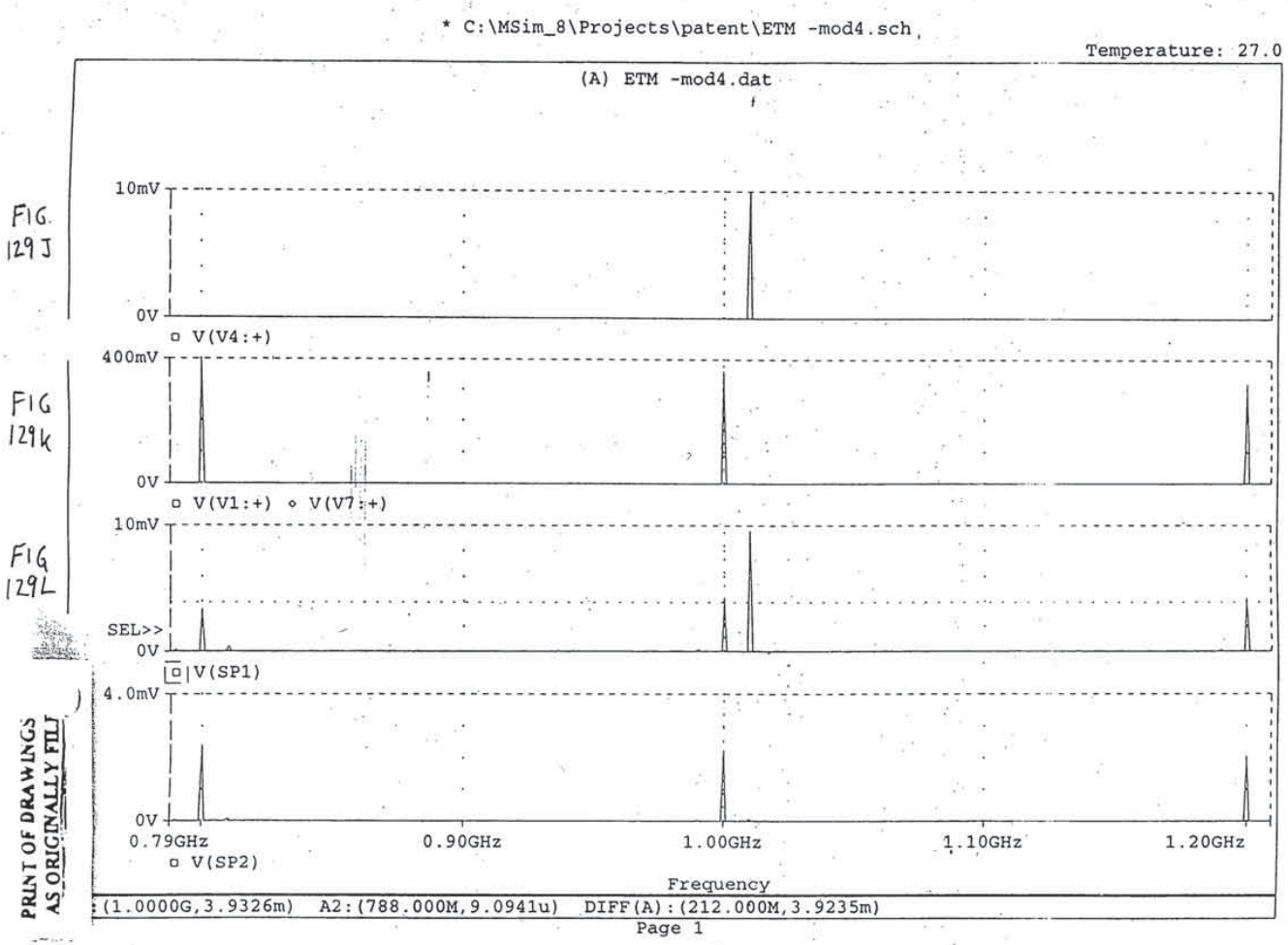


FIG. 129J

FIG 129K

FIG 129L

PRINT OF DRAWINGS AS ORIGINALLY FILED

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565

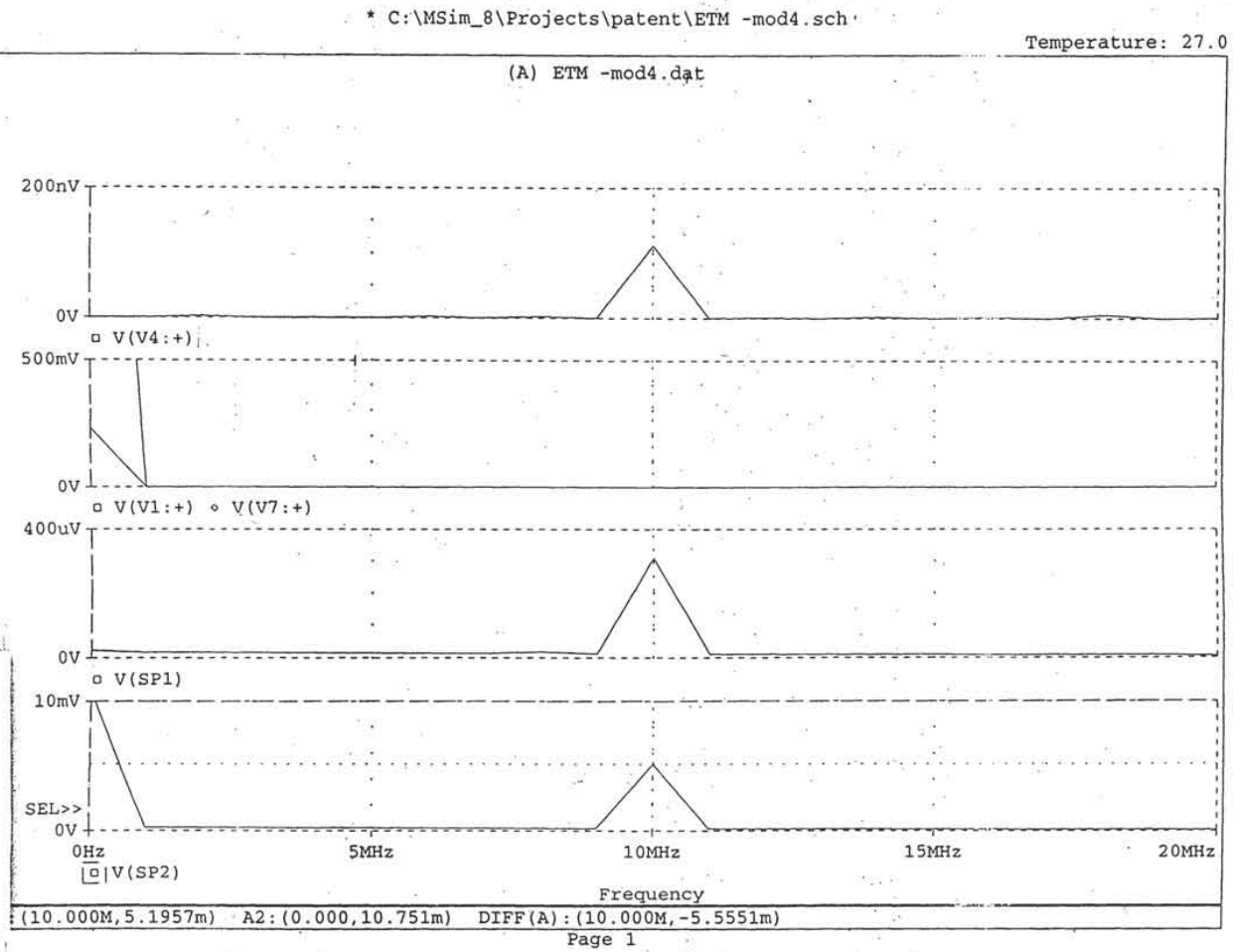


FIG 129N

FIG 129O

FIG

PRINT OF DRAWINGS AS ORIGINALLY FILED

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PRINT OF DRAWINGS
AS ORIGINALLY FILI

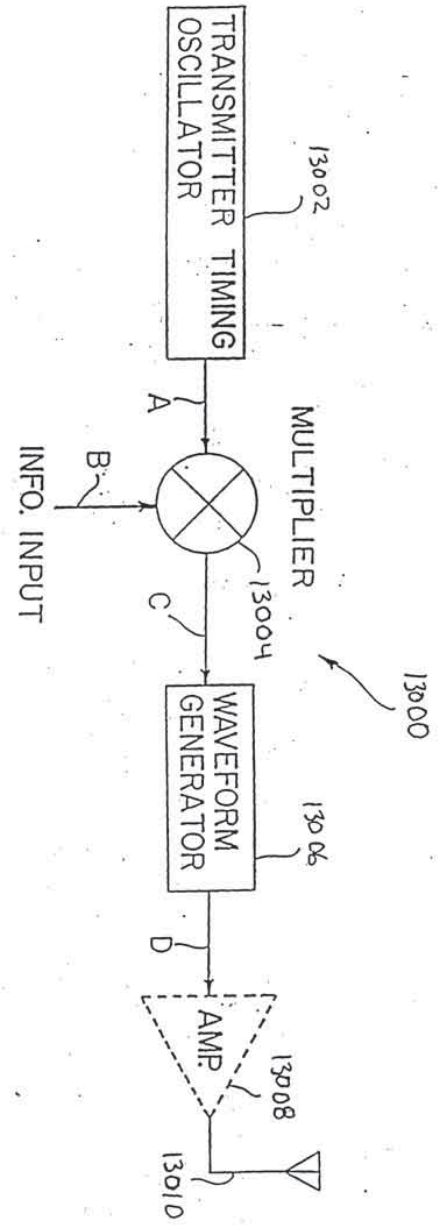


FIG. 130

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 13

PRINT OF DRAWINGS
AS ORIGINALLY FILF

FIG. 132

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 133

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 13A

PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG. 135

PRINT OF DRAWINGS
AS ORIGINALLY FILF

FIG. 136

PRINT OF DRAWINGS
AS ORIGINALLY FILI

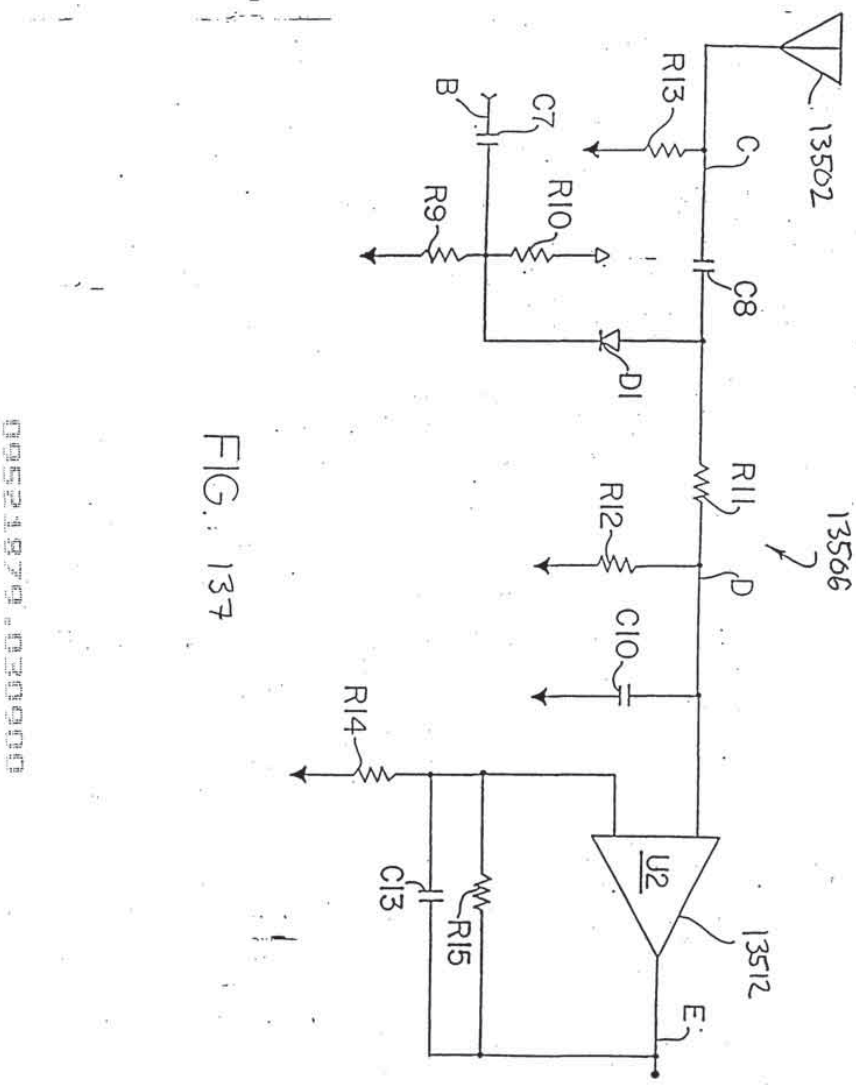


FIG. 137

PRINT OF DRAWINGS
AS ORIGINALLY FILED

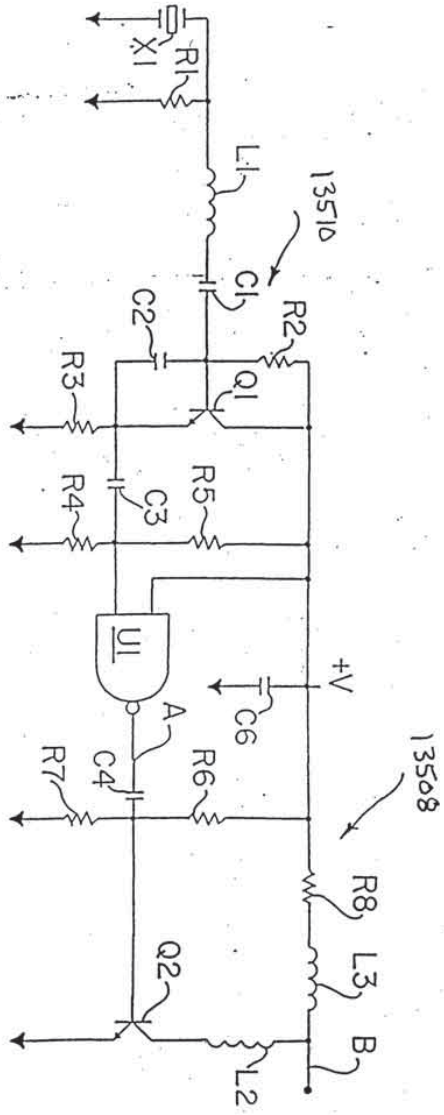


FIG. 138

PRINT OF DRAWINGS
AS ORIGINALLY FILED

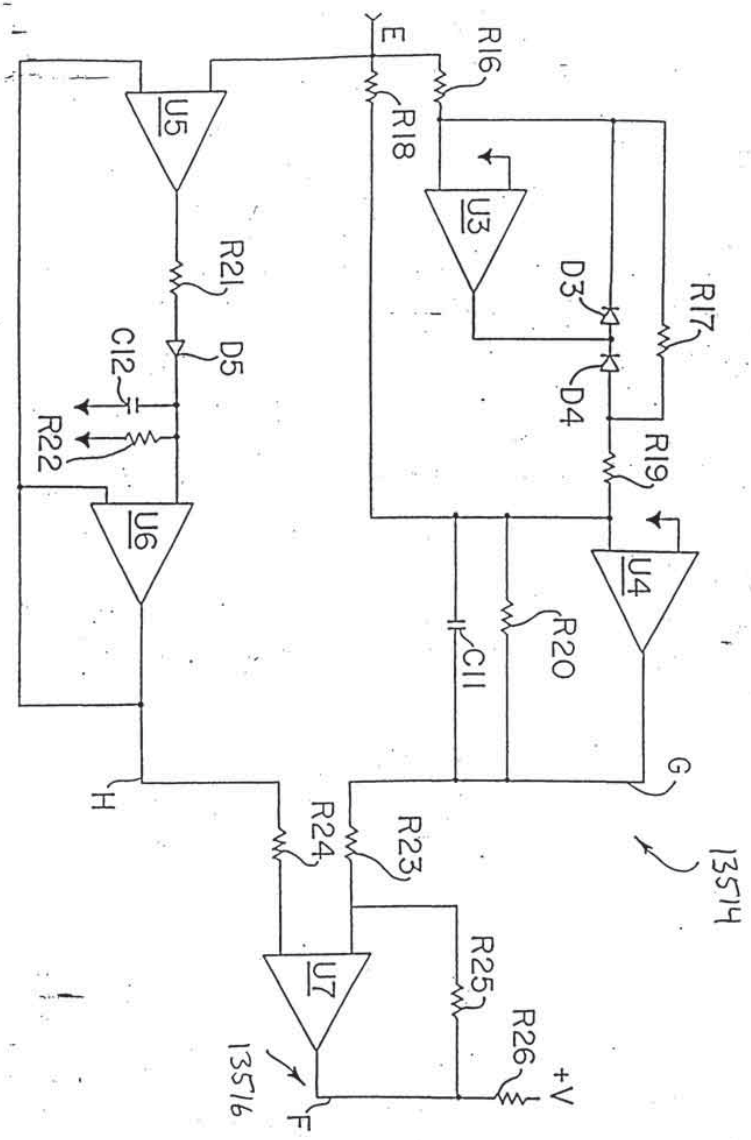


FIG. 139

PRINT OF DRAWINGS
AS ORIGINALLY FILE

FIG. 14a

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 14

PRINT OF DRAWINGS
AS ORIGINALLY FIT

FIG. 142

PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 143

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 144

RF DIFFERENTIAL RECEIVER

PRINT OF DRAWINGS
AS ORIGINALLY FIL

PSEUDO DIFFERENTIAL RECEIVER

FIG. 145

PRINT OF DRAWINGS
AS ORIGINALLY FIL

NARROW BAND/ CONSTANT CARRIER

FIG. 146

PRINT OF DRAWINGS
AS ORIGINALLY FIL

NARROW BAND/CONSTANT CARRIER

FIG. 147

PRINT OF DRAWINGS
AS ORIGINALLY FIL

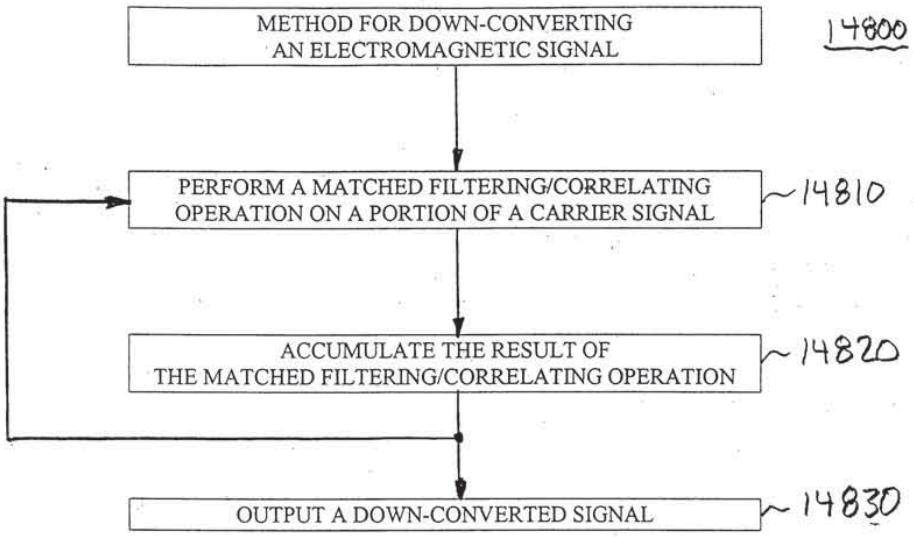


FIG. 148

PRINT OF DRAWINGS
AS ORIGINALLY FILED

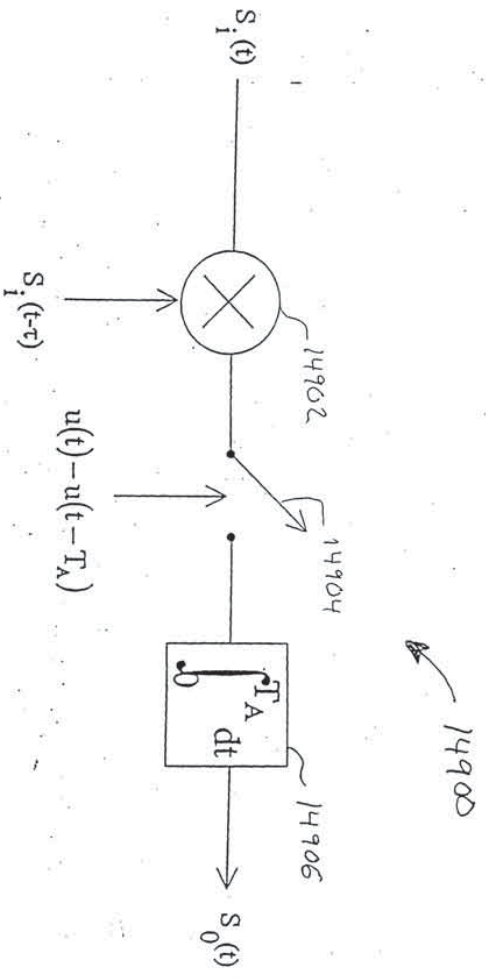


FIG. 149

PRINT OF DRAWINGS
AS ORIGINALLY FILED

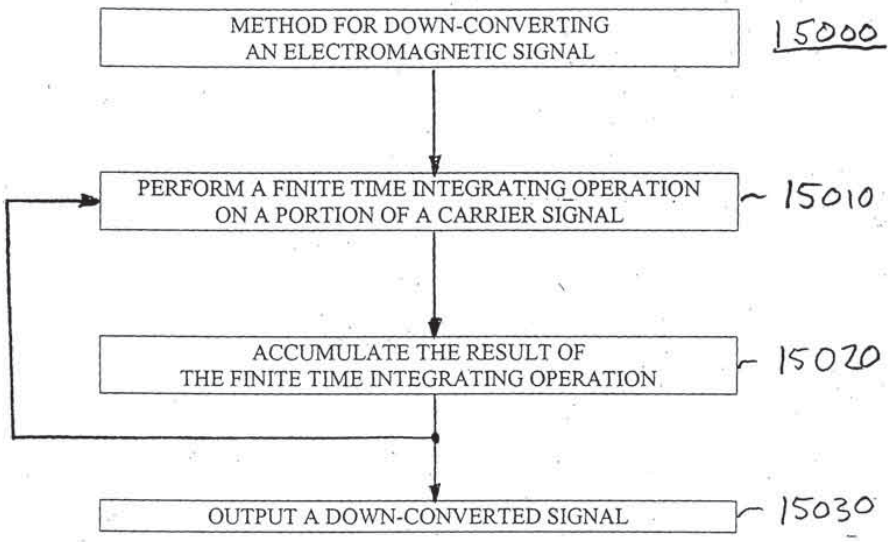


FIG. 150

PRINT OF DRAWINGS
AS ORIGINALLY FILED

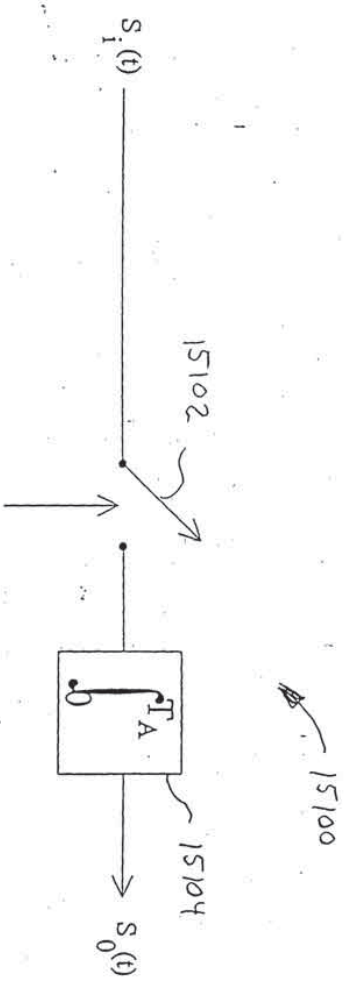


FIG. 151

PRINT OF DRAWINGS
AS ORIGINALLY FT

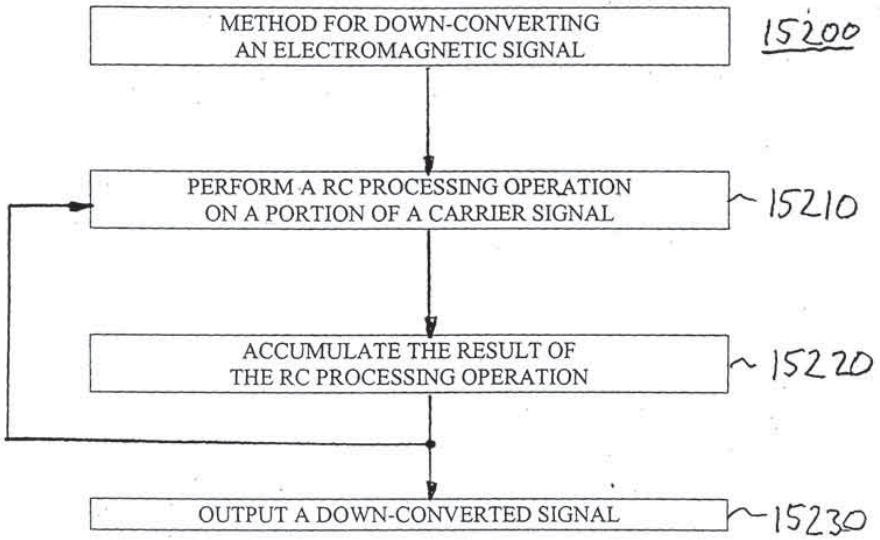


FIG. 152

PRINT OF DRAWINGS
AS ORIGINALLY FILED

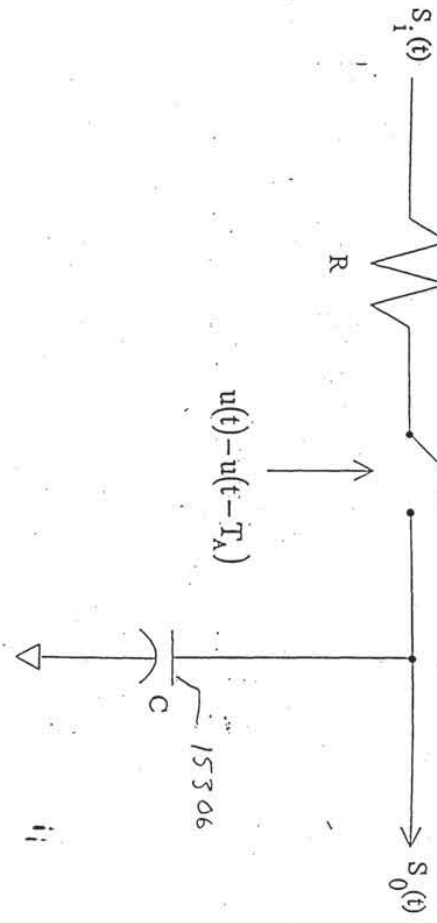


FIG. 153

PRINT OF DRAWINGS
AS ORIGINALLY FT

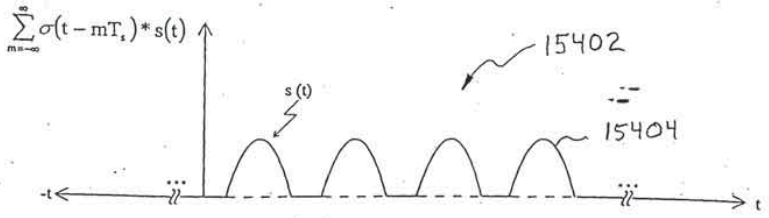


FIG. 154

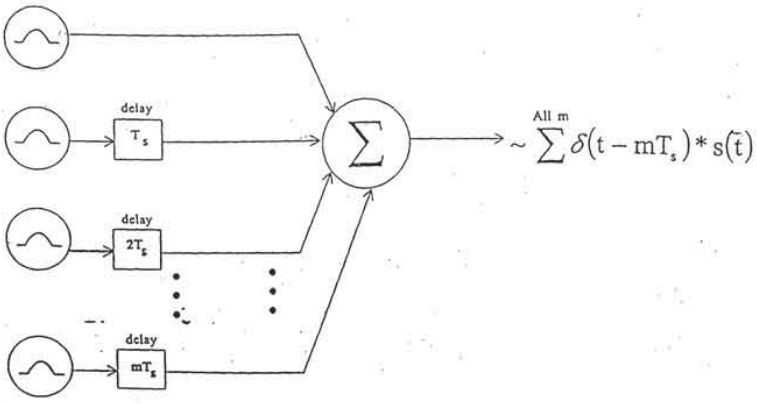


FIG. 155

PRINT OF DRAWINGS
AS ORIGINALLY FT

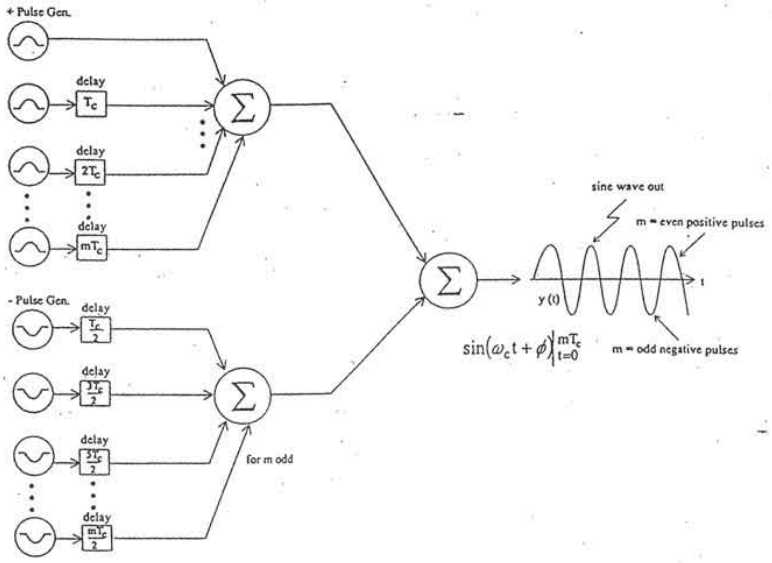
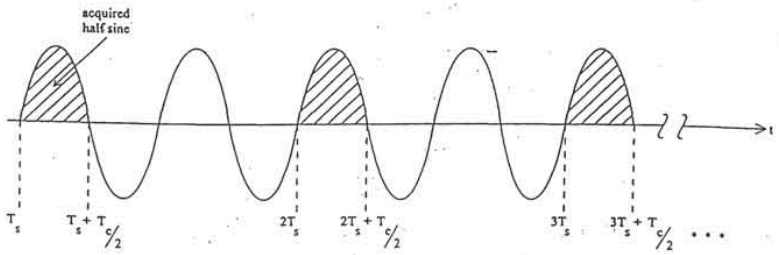


FIG. 156

PRINT OF DRAWINGS
AS ORIGINALLY FT



Carrier Processed by 3rd Harmonic UFT Processor

FIG. 157

PRINT OF DRAWINGS
AS ORIGINALLY FT

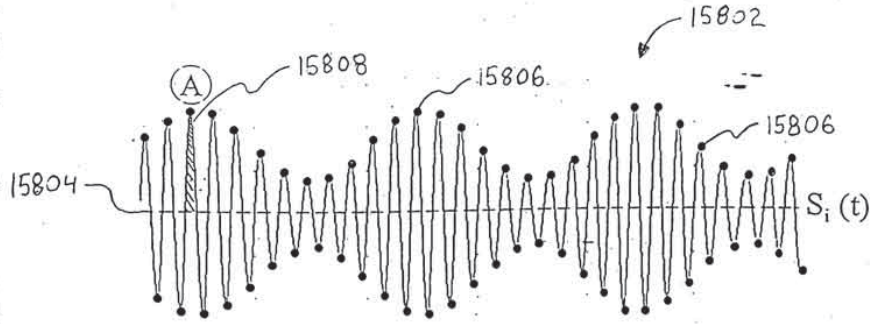


FIG. 158

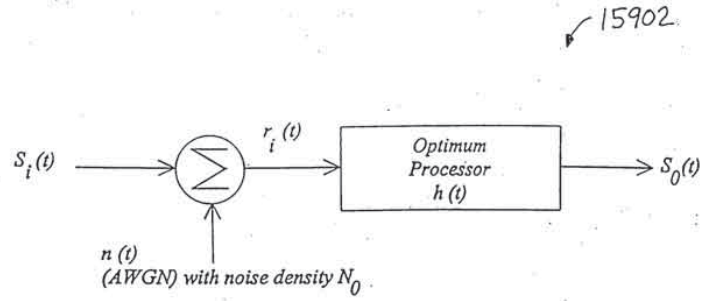


FIG. 159

PRINT OF DRAWINGS
AS ORIGINALLY FT

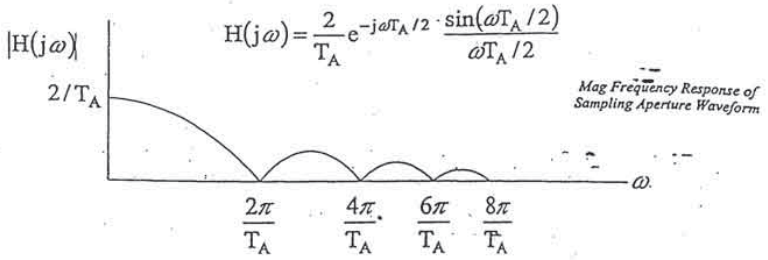
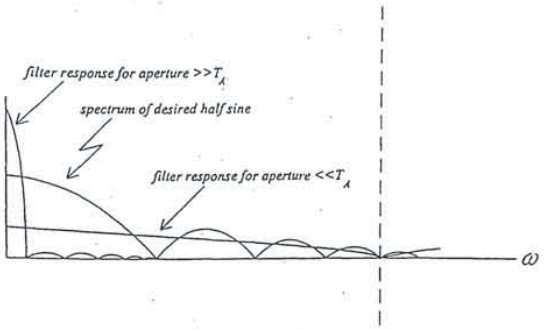


FIG. 160



Aperture Frequency Domain Representation

FIG. 161

PRINT OF DRAWINGS
AS ORIGINALLY FT

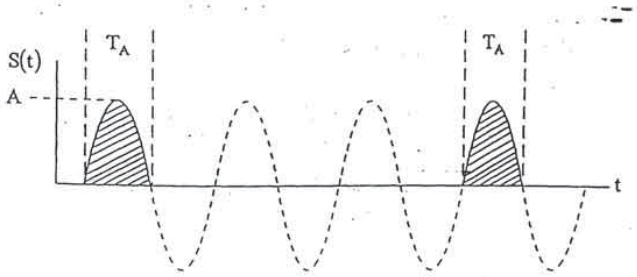


FIG. 162

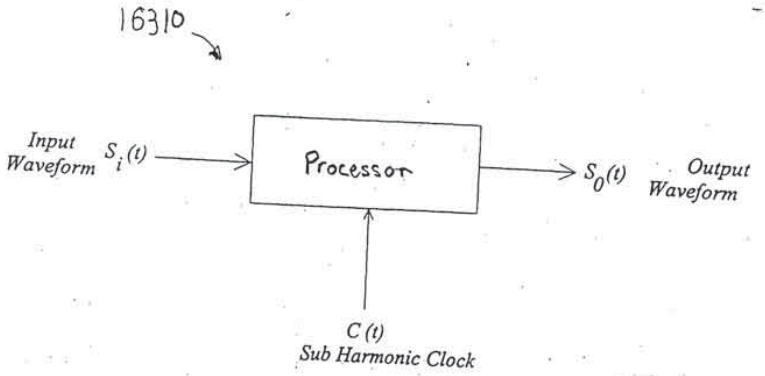


FIG. 163

PRINT OF DRAWINGS
AS ORIGINALLY FI

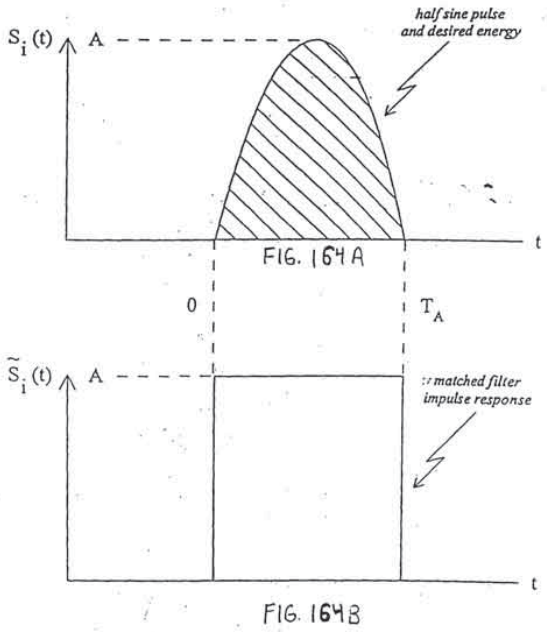


FIG. 164A

FIG. 164B

PRINT OF DRAWINGS
AS ORIGINALLY FT

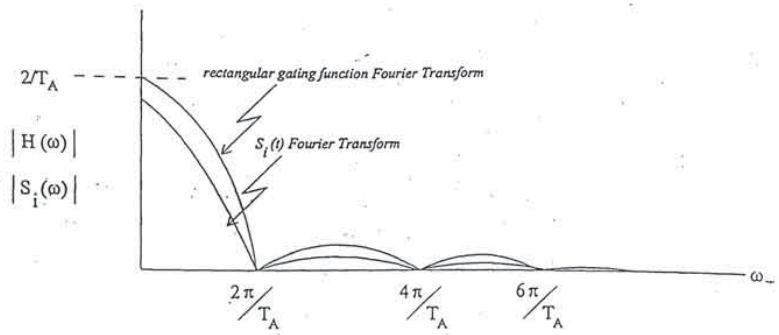


FIG. 164C

PRINT OF DRAWINGS
AS ORIGINALLY FI

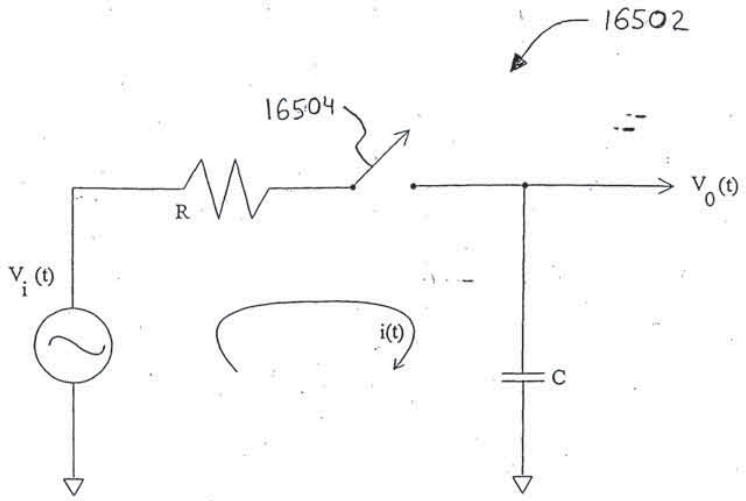


FIG. 165

PRINT OF DRAWINGS
AS ORIGINALLY FT

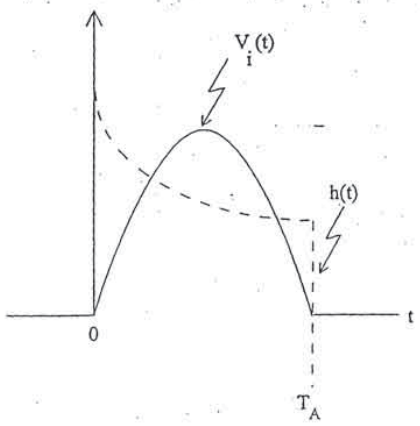


FIG. 166

PRINT OF DRAWINGS
AS ORIGINALLY FI

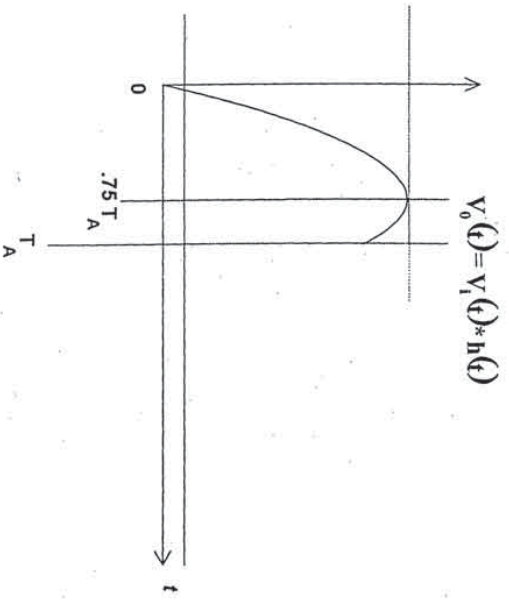


FIG. 167

PRINT OF DRAWINGS
AS ORIGINALLY FI

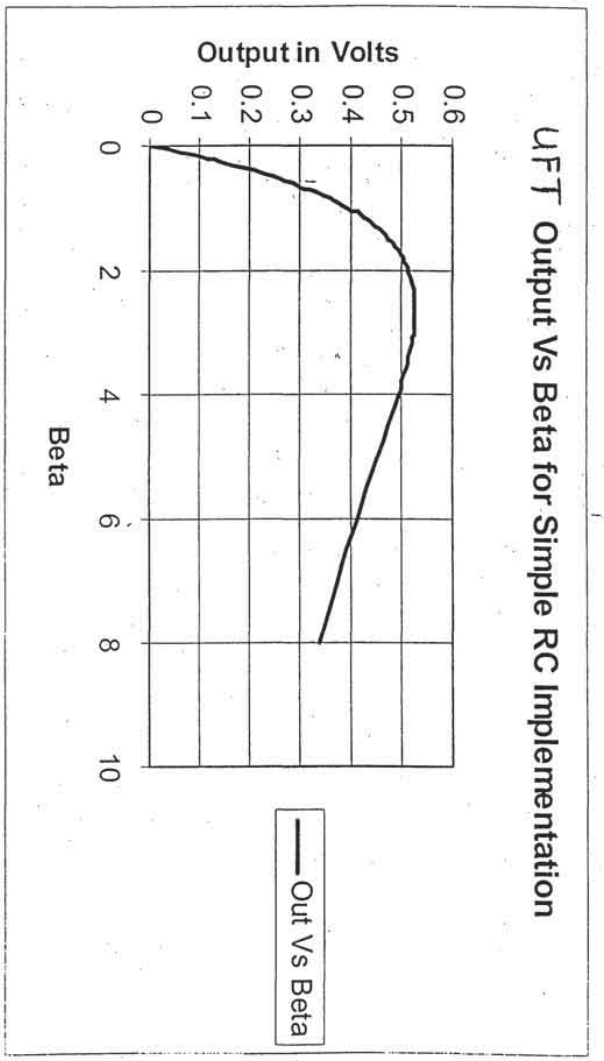


FIG 168

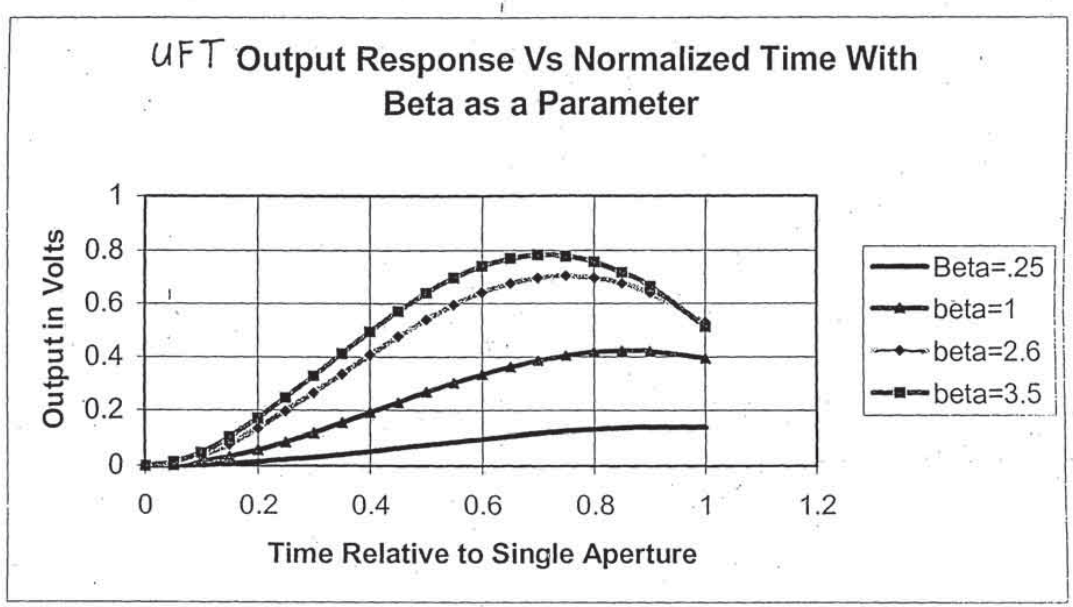


FIG. 169

PRINT OF DRAWINGS AS ORIGINALLY FI

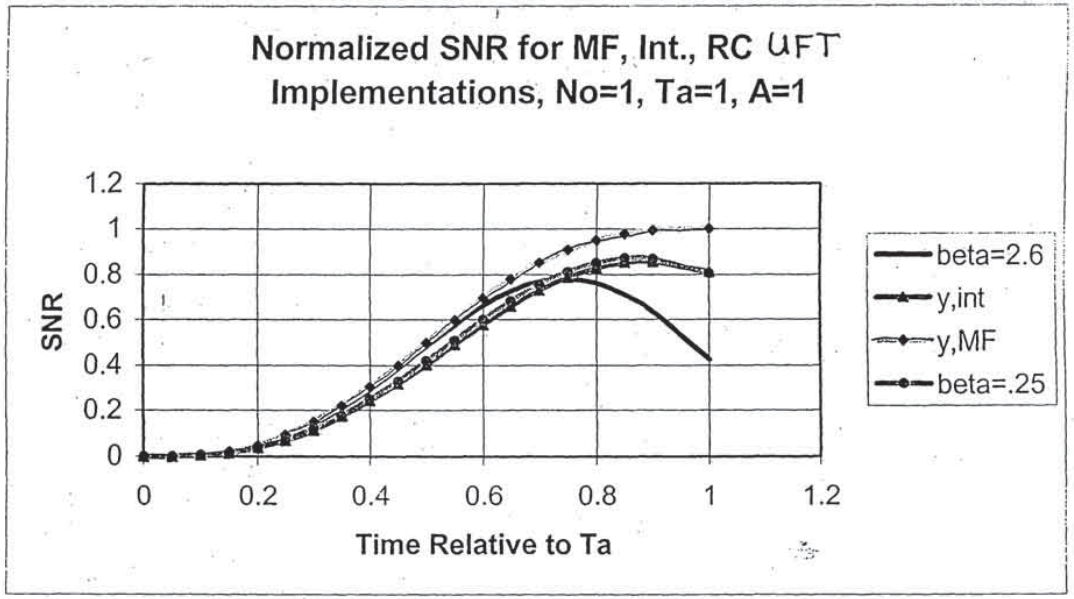


FIG. 170

PRINT OF DRAWINGS
AS ORIGINALLY FI

PRINT OF DRAWINGS
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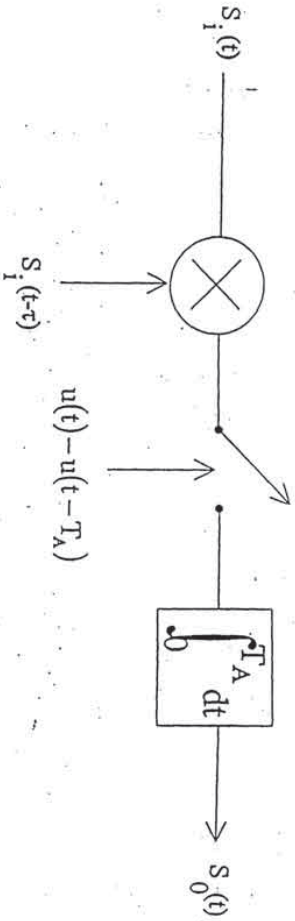


FIG. 17

PRINT OF DRAWINGS
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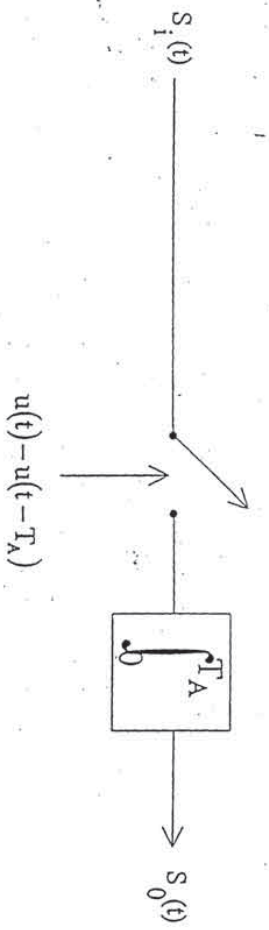


FIG. 172

PRINT OF DRAWINGS
AS ORIGINALLY FI

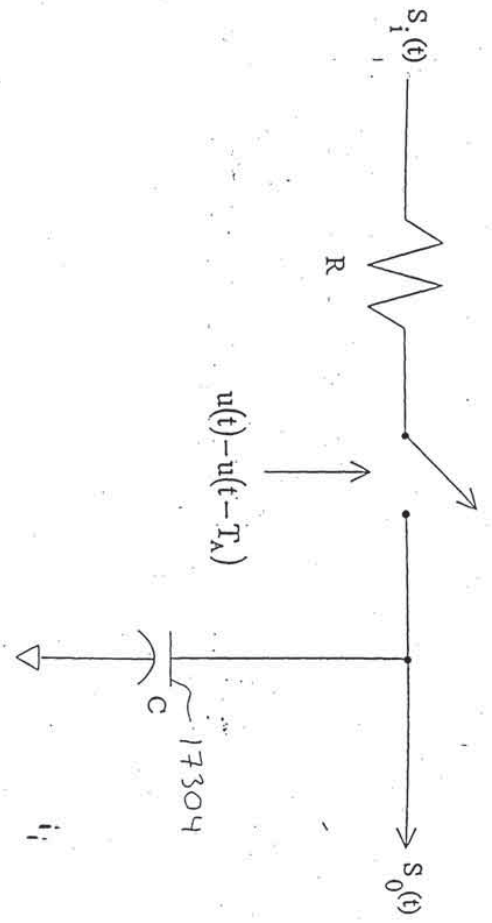


FIG. 173

PRINT OF DRAWINGS
AS ORIGINALLY FT

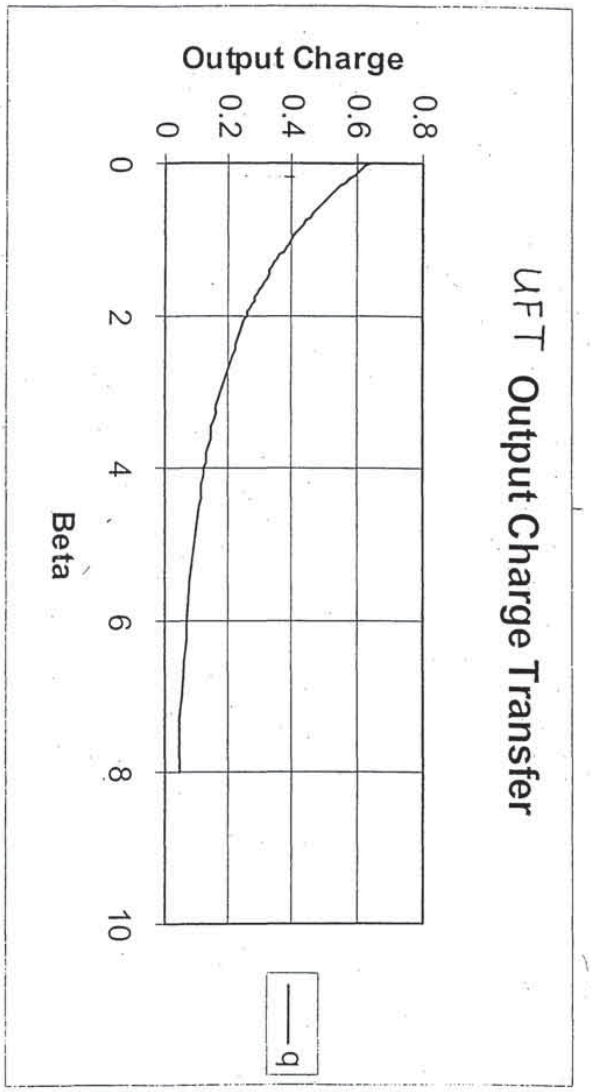


FIG. 17A

PRINT OF DRAWINGS
AS ORIGINALLY FT

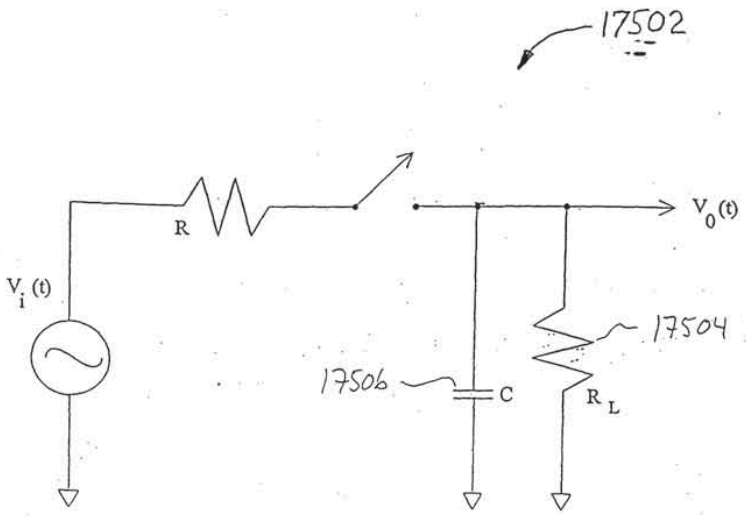


FIG. 175

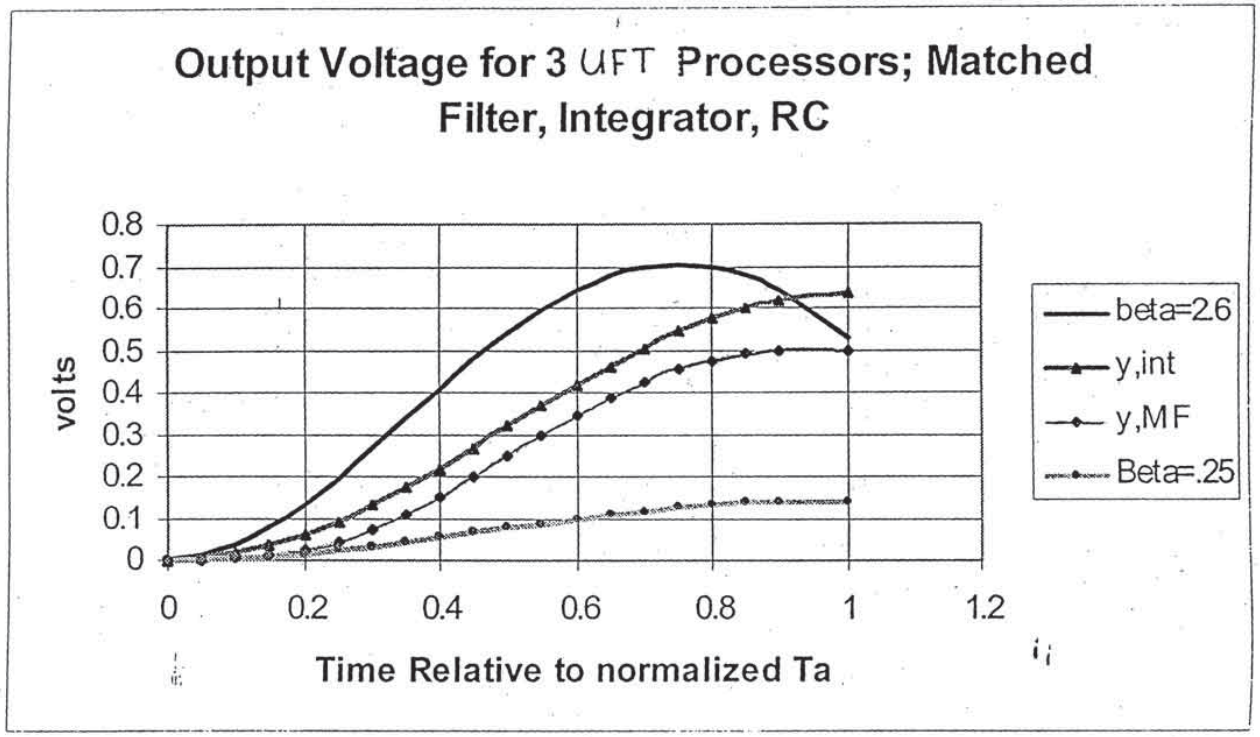


FIG. 17G

PRINT OF DRAWINGS AS ORIGINALLY FI

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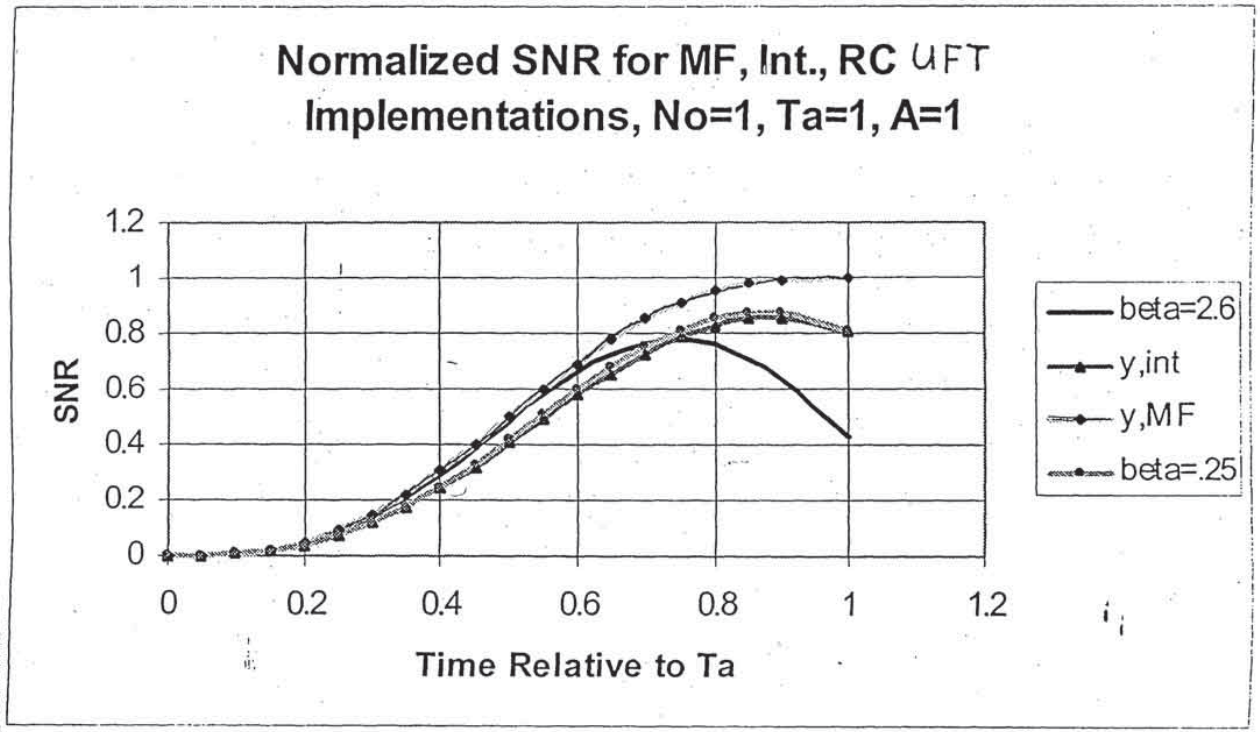


FIG. 177

PRINT OF DRAWINGS
AS ORIGINALLY FT

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PRINT OF DRAWINGS
AS ORIGINALLY FI

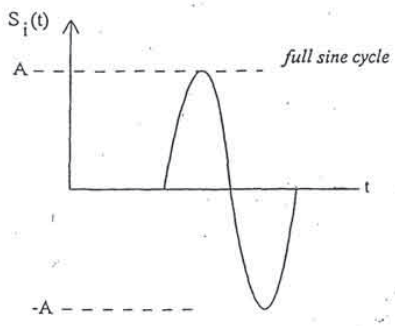


FIG. 178A

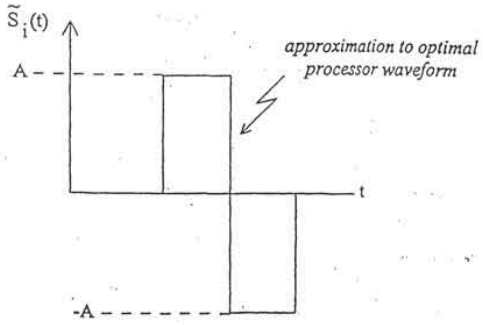


FIG. 178B

PRINT OF DRAWINGS
AS ORIGINALLY FT

FIG. 179

PRINT OF DRAWINGS
AS ORIGINALLY FT

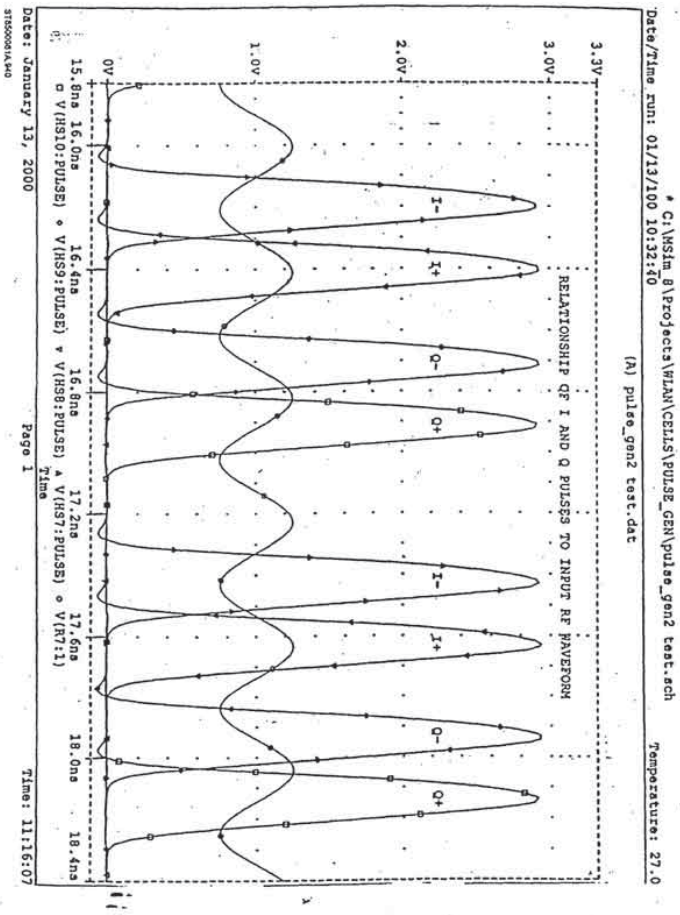


FIG 18O

PRINT OF DRAWINGS
AS ORIGINALLY FT

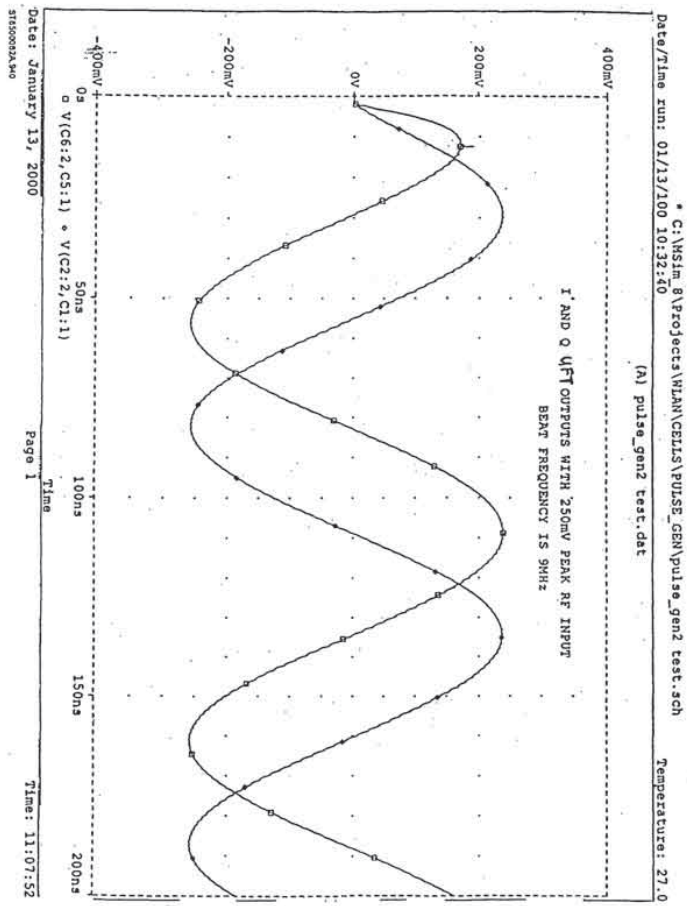


FIG. 181

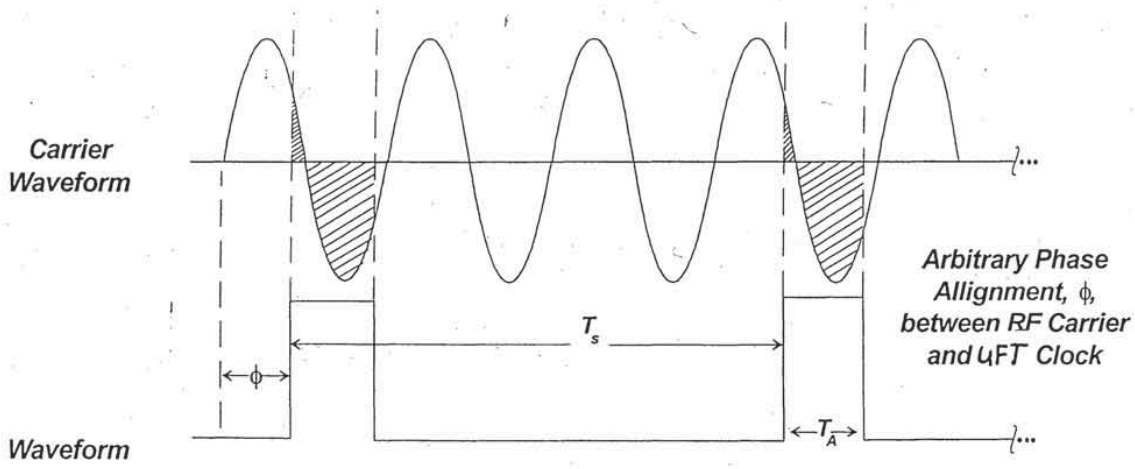


FIG. 182

PRINT OF DRAWINGS
AS ORIGINALLY FI

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PRINT OF DRAWINGS
AS ORIGINALLY FT

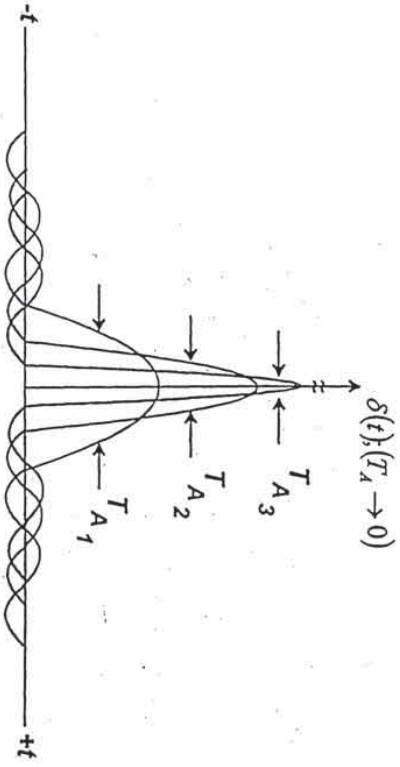


FIG. 183

PRINT OF DRAWINGS
AS ORIGINALLY FT

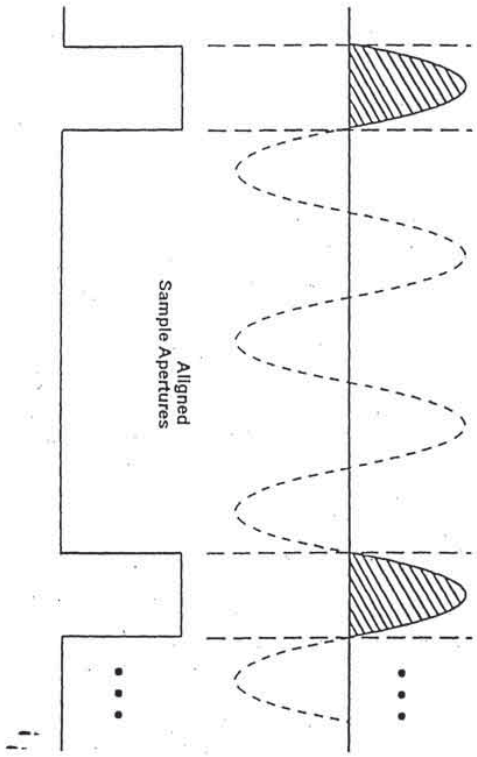


FIG. 18A

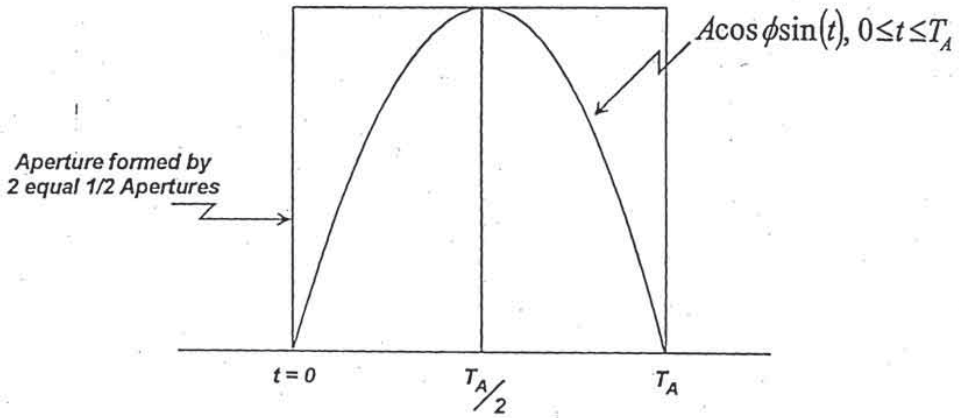


FIG. 185

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AS ORIGINALLY FI

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 18G

PRINT OF DRAWINGS
AS ORIGINALLY FILED

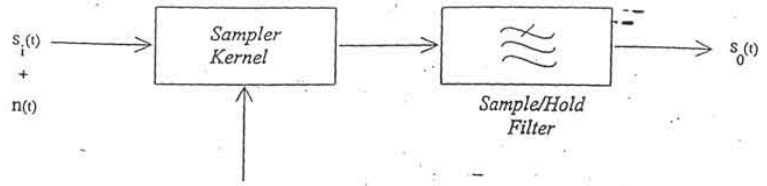


FIG. 187

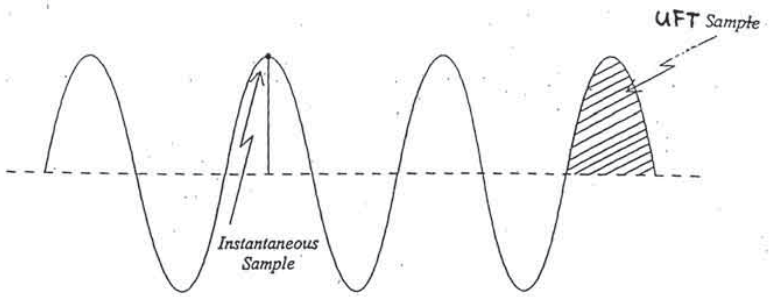


FIG. 188

PRINT OF DRAWINGS
AS ORIGINALLY FT

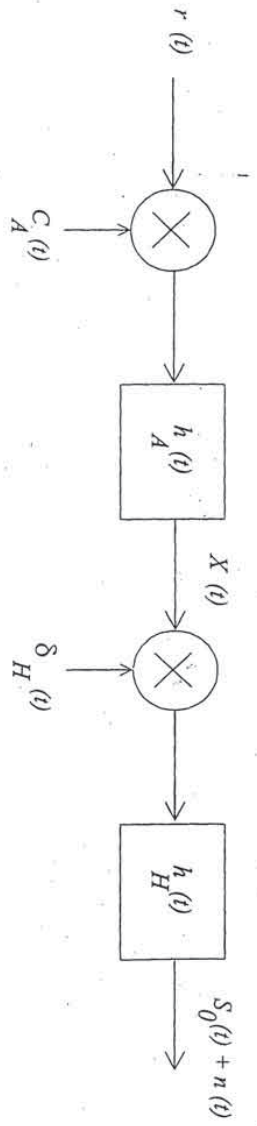


FIG. 189

PRINT OF DRAWINGS
AS ORIGINALLY FT

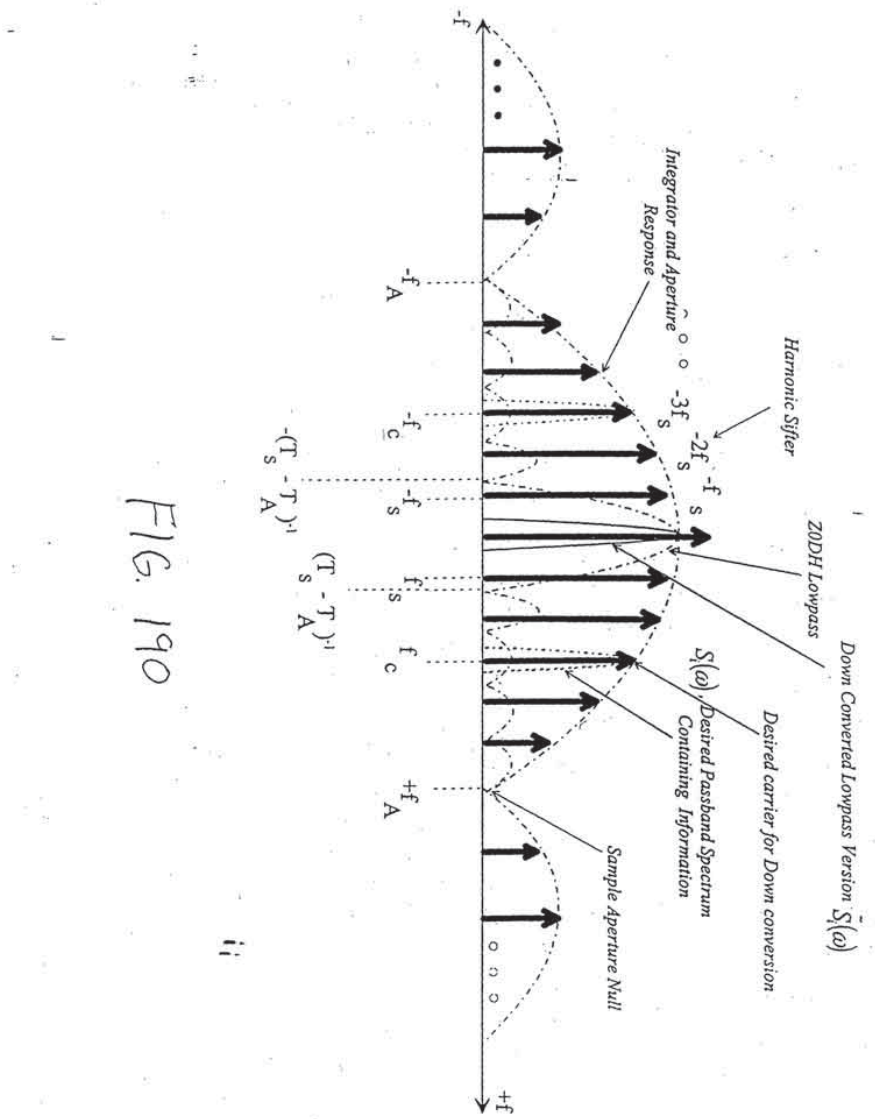


FIG. 190

PRINT OF DRAWINGS
AS ORIGINALLY FT

FIG. 19

PRINT OF DRAWINGS
AS ORIGINALLY FT

FIG. 192

PRINT OF DRAWINGS
AS ORIGINALLY FILED

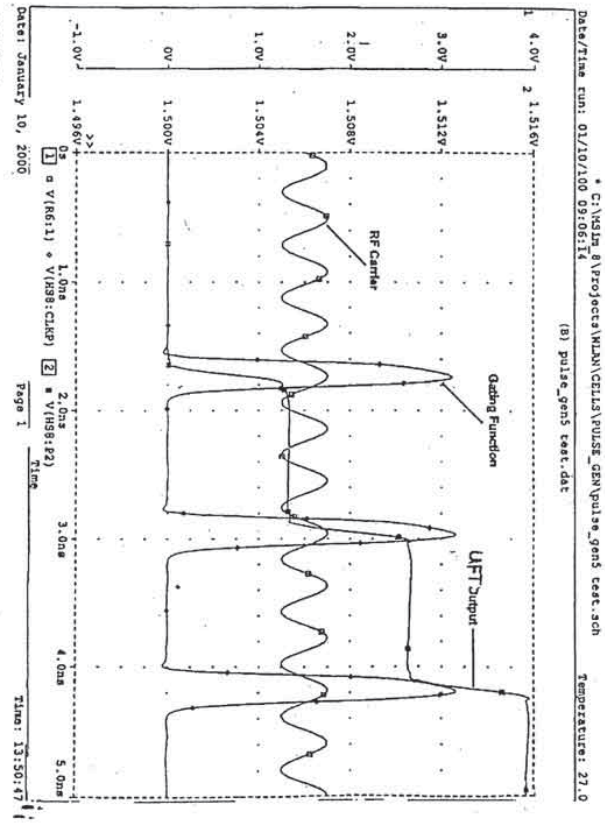


FIG. 193

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 194

PRINT OF DRAWINGS
AS ORIGINALLY FT

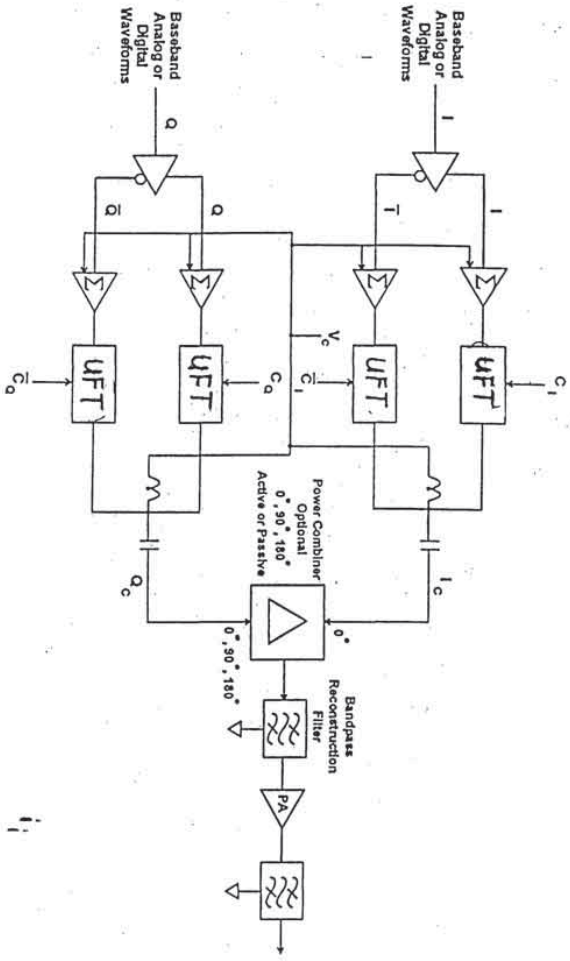


FIG. 195

PRINT OF DRAWINGS
AS ORIGINALLY FT

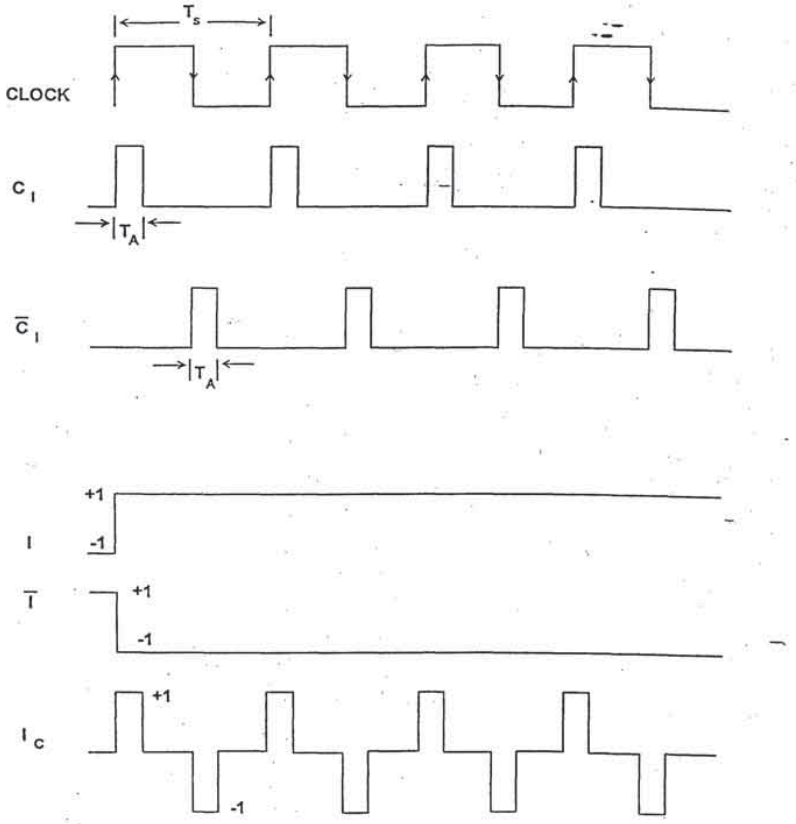


FIG. 196

PRINT OF DRAWINGS
AS ORIGINALLY FT

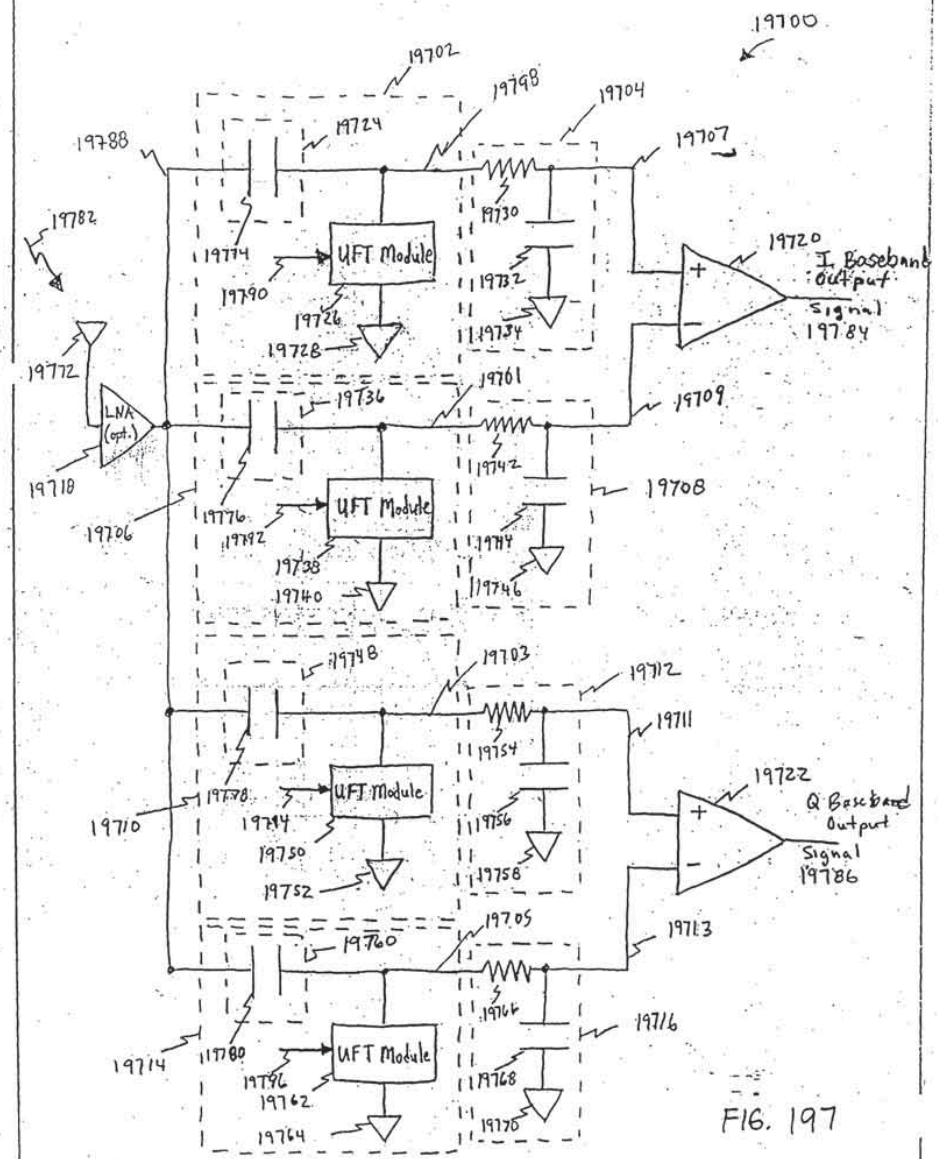


FIG. 197

PRINT OF DRAWINGS
AS ORIGINALLY FT

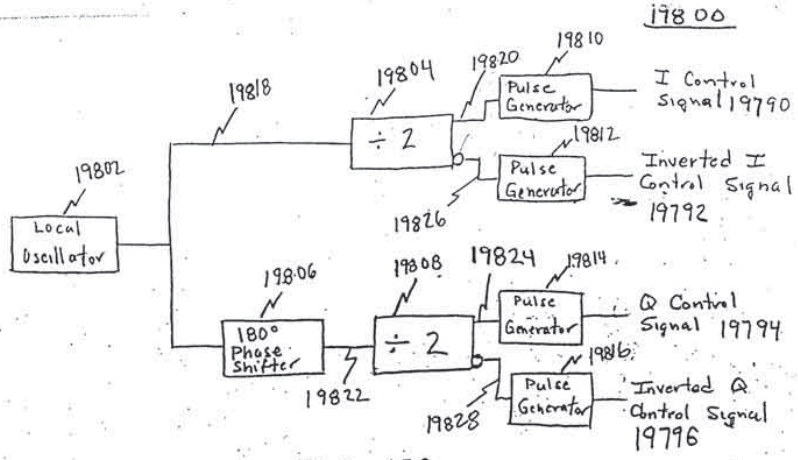


FIG. 198

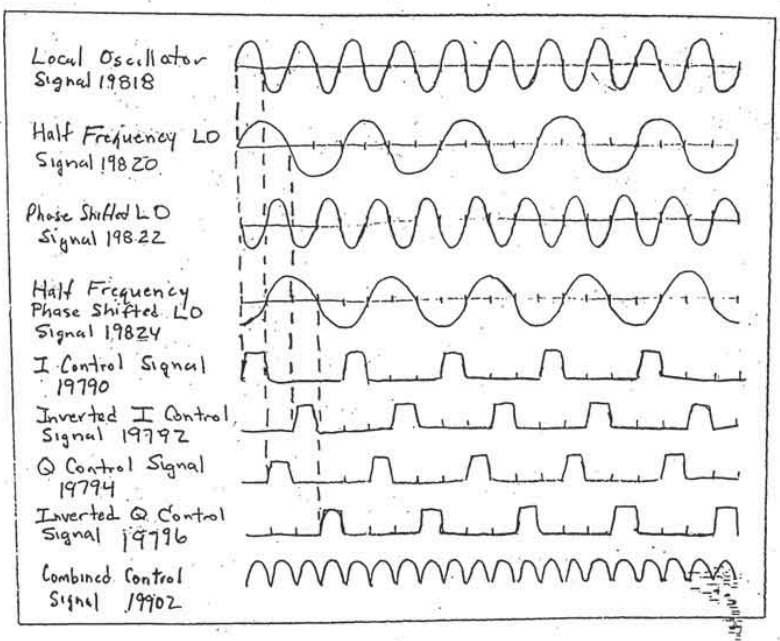


FIG. 199

PRINT OF DRAWINGS
AS ORIGINALLY FT

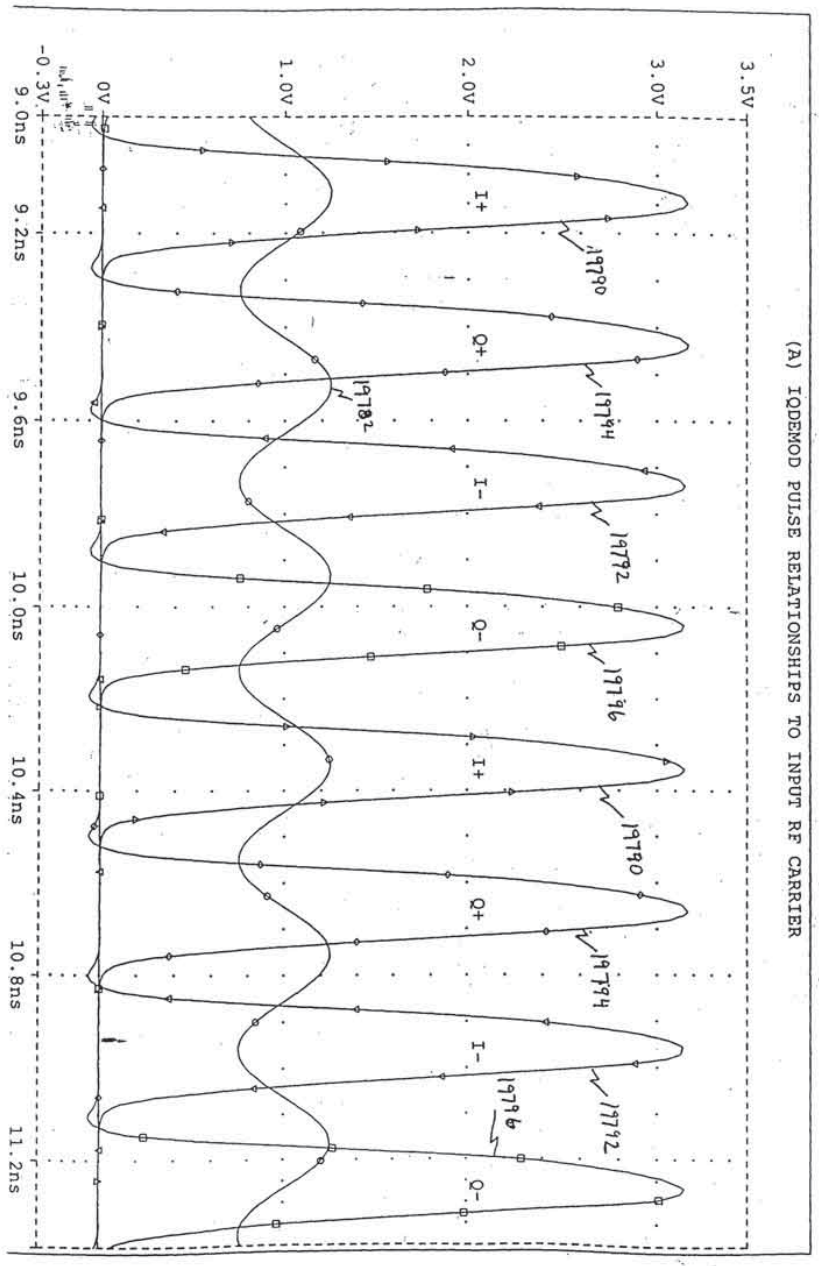


FIG. 200

PRINT OF DRAWINGS
AS ORIGINALLY FT

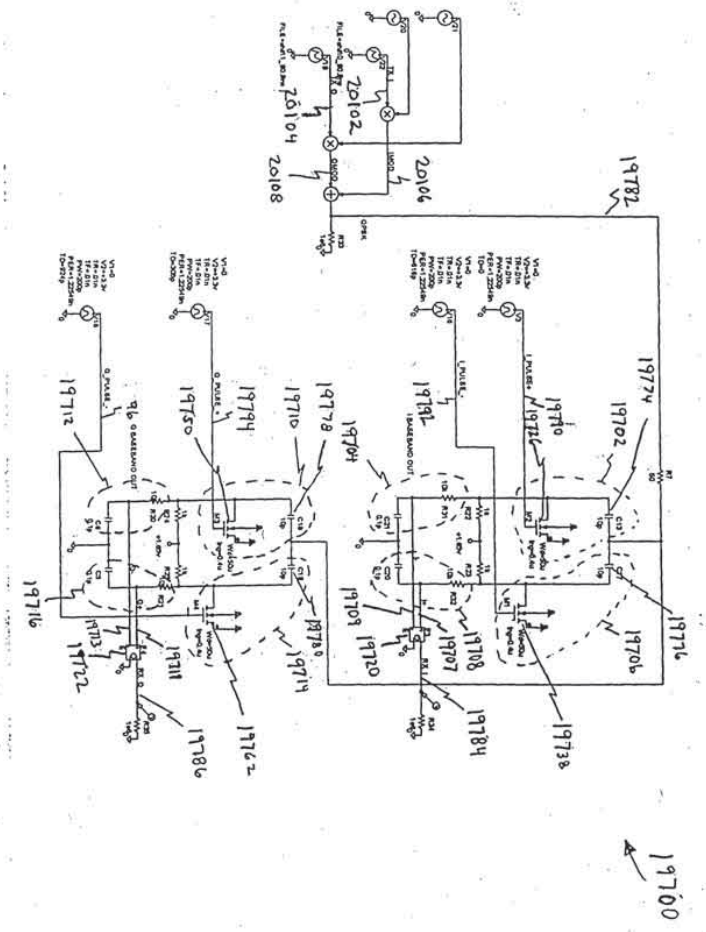
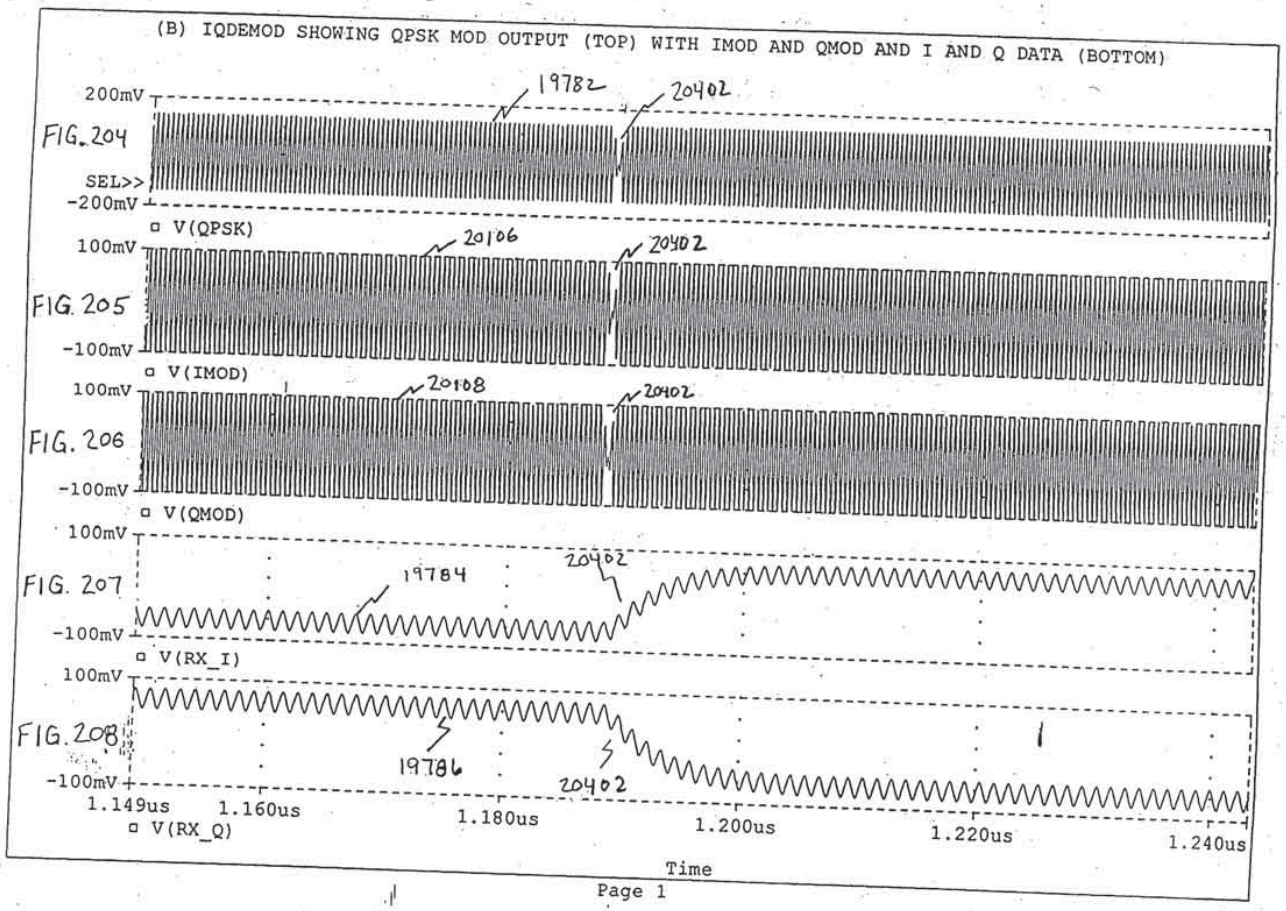


FIG. 201

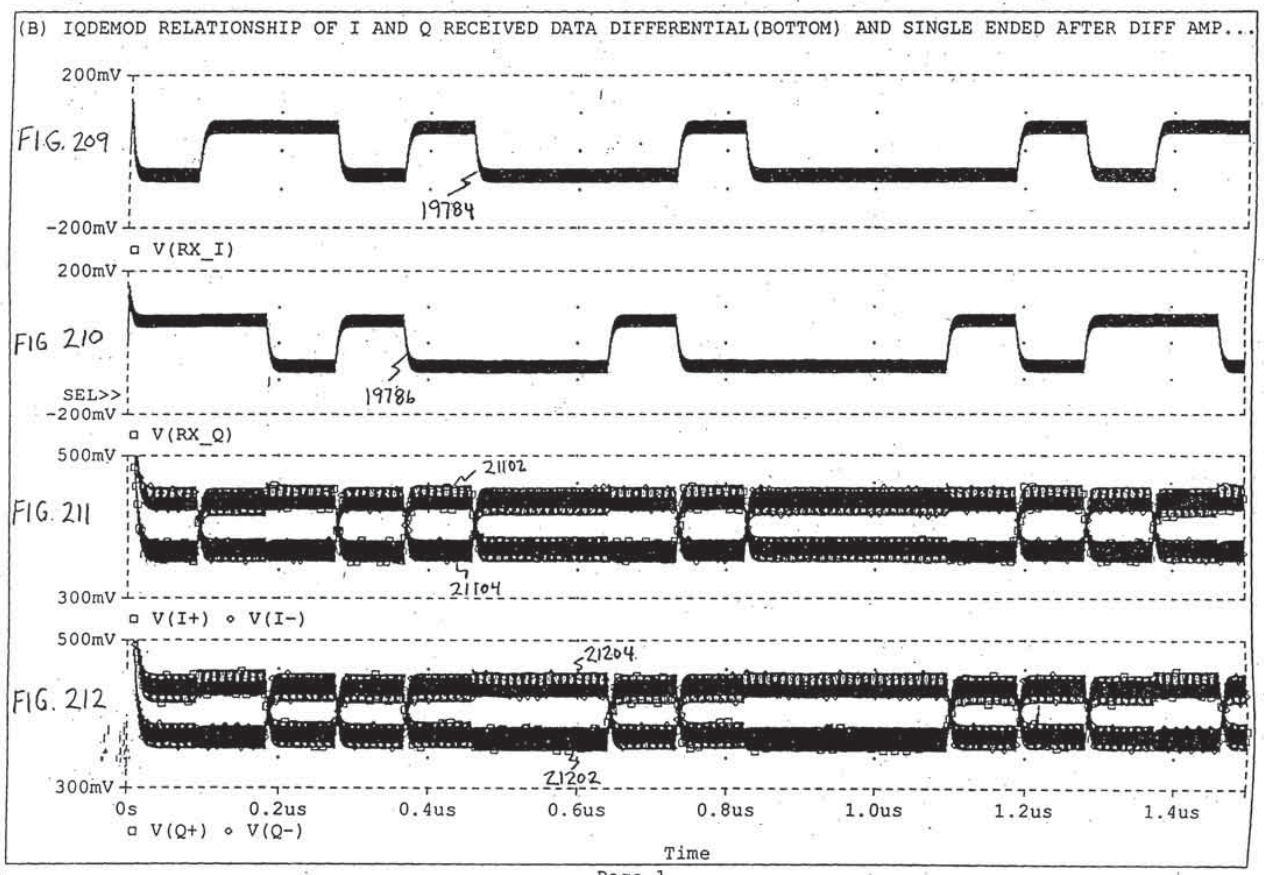
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PRINT OF DRAWINGS
AS ORIGINALLY FT



Page 1

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Page 1

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636

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AS ORIGINALLY FT

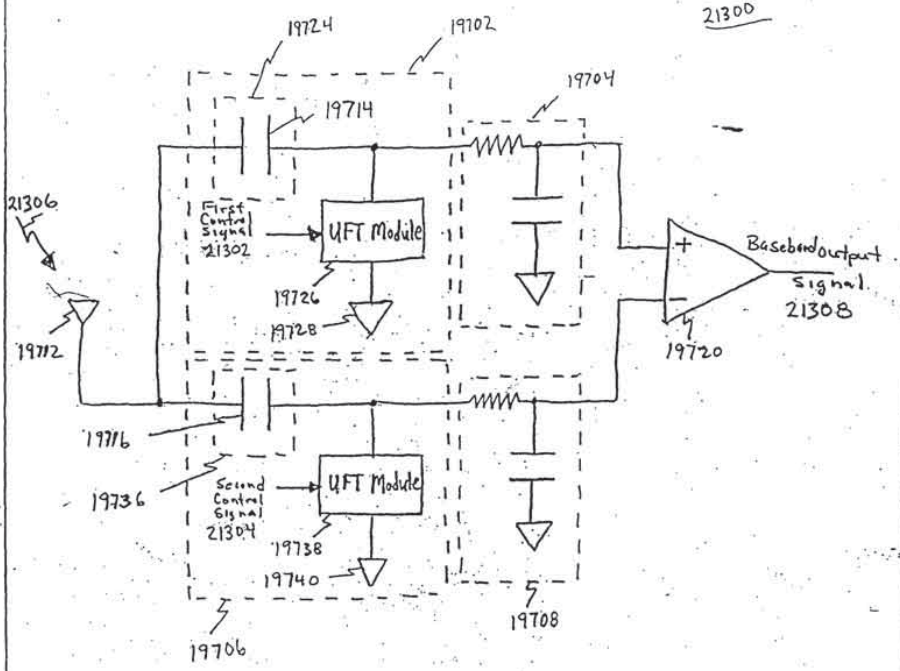


FIG. 213

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FIG. 1

PRINT OF DRAWINGS
AS ORIGINALLY FT

Example Analog Modulating Baseband Signal F_{mB}

FIG. 2

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AS ORIGINALLY FT
Second State 314
First State 312
310
Example Digital Modulating Baseband Signal Fm8
FIG. 3

PRINT OF DRAWINGS
AS ORIGINALLY FT

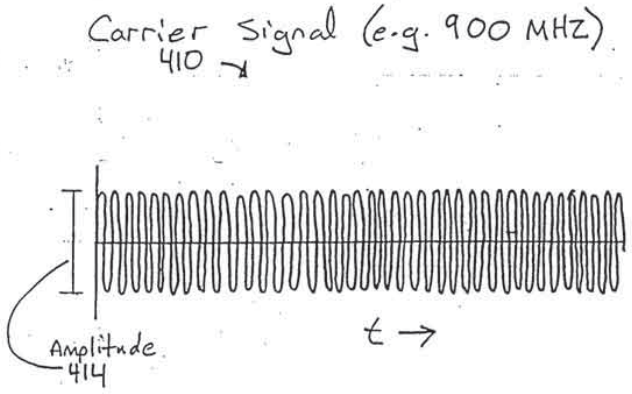


FIG. 4

PRINT OF DRAWINGS
AS ORIGINALLY FI

Analog Baseband Signal
210

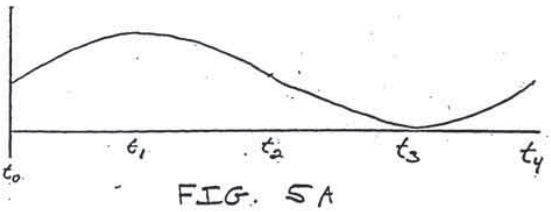


FIG. 5A

Carrier Signal 410

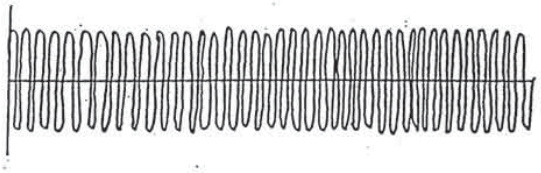


FIG. 5B

AM Carrier Signal 516

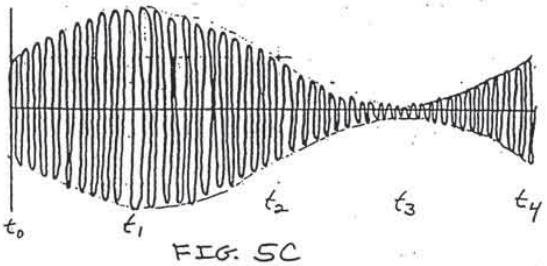


FIG. 5C

5

PRINT OF DRAWINGS
AS ORIGINALLY FILED

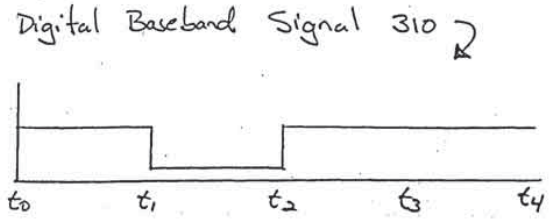


FIG. 6A

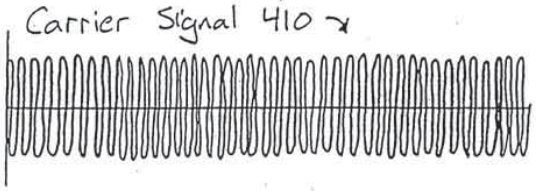


FIG. 6B

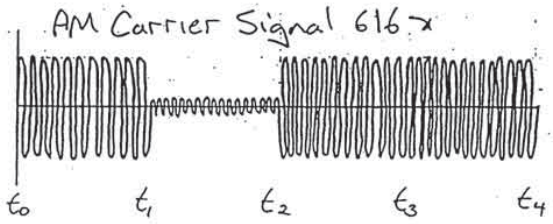


FIG. 6C

PRINT OF DRAWINGS
AS ORIGINALLY FILED

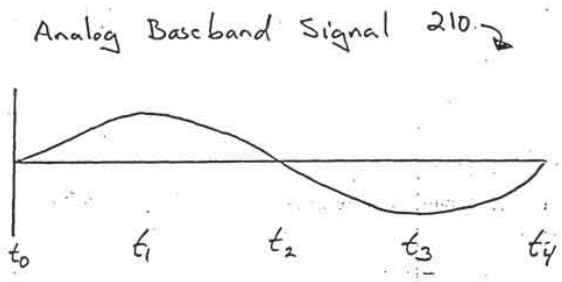


FIG. 7A

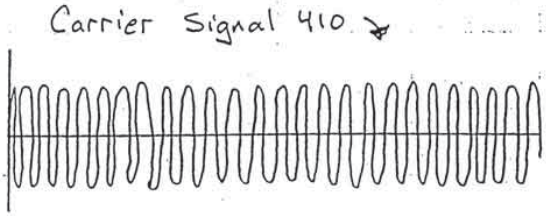


FIG. 7B

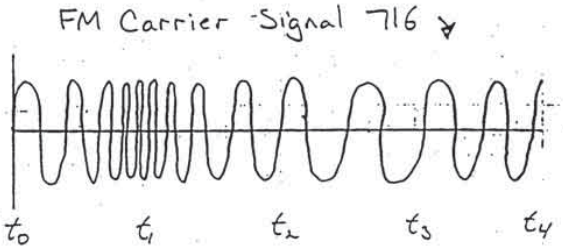


FIG. 7C

PRINT OF DRAWINGS
AS ORIGINALLY FILED

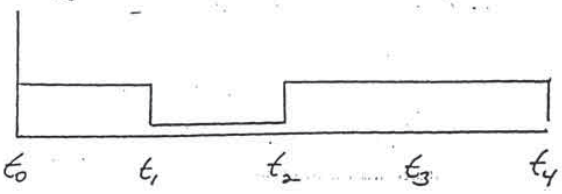


FIG. 8A

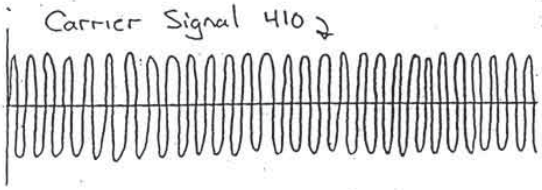


FIG. 8B

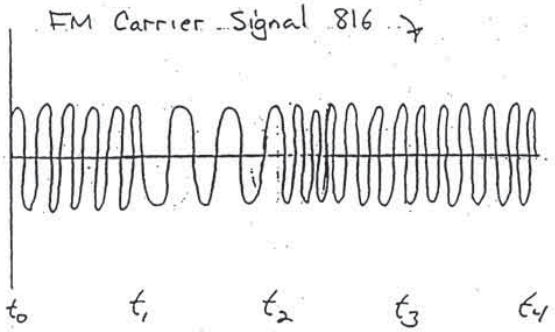


FIG 8C

PRINT OF DRAWINGS
AS ORIGINALLY FIL

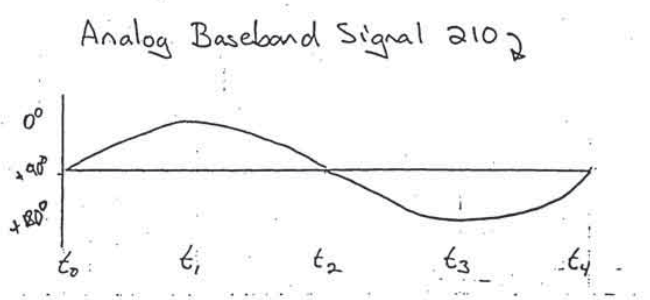


FIG. 9A

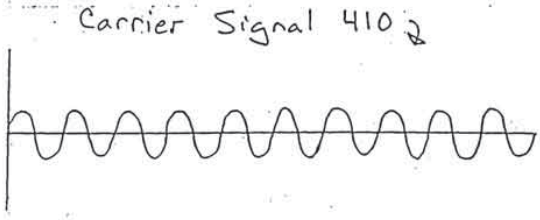


FIG. 9B

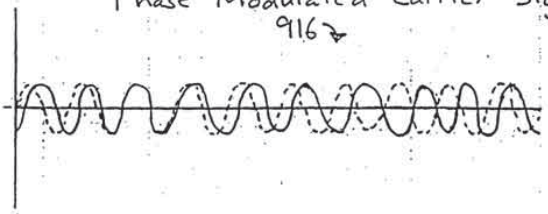


FIG. 9C

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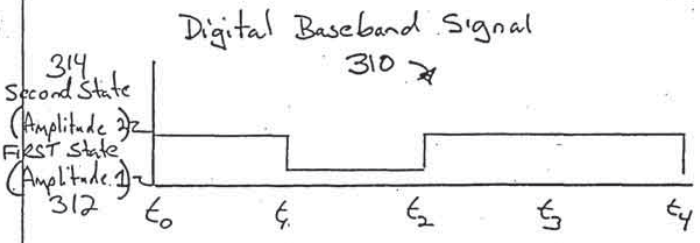


FIG. 10A

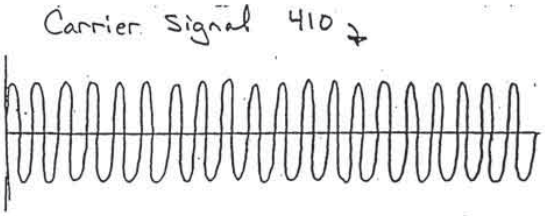


FIG. 10B

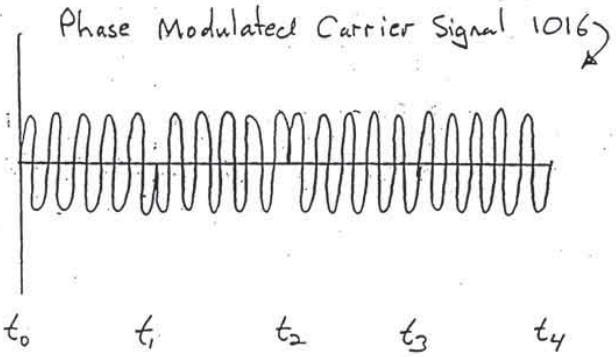
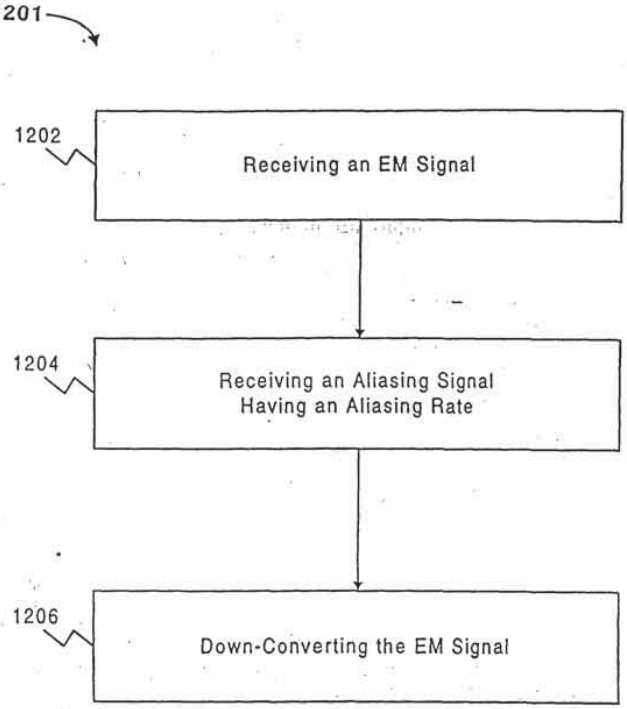


FIG. 10C

PRINT OF DRAWINGS
AS ORIGINALLY FIL
Conventional Receiver
1102
EM Signal
(e.g., 900 MHZ)
1104
1106
RF Stage 1112
LNA
1121
Filter
1123
1116a
LO 1120a
1119a
(e.g., 830 MHZ)
IF Stage 1114a
1108a
(e.g., 70 MHZ)
1118a
LNA
1124a
Filter
1122a
1116n
LO 1120n
1119n
(e.g., 59 MHZ)
IF Stage 1114n
1108n
(e.g., 11 MHZ)
1118n
LNA
1124n
Filter
1122n
IF Signal
1108n
Signal
Processor
1110

FIG. 11

PRINT OF DRAWINGS
AS ORIGINALLY FILED



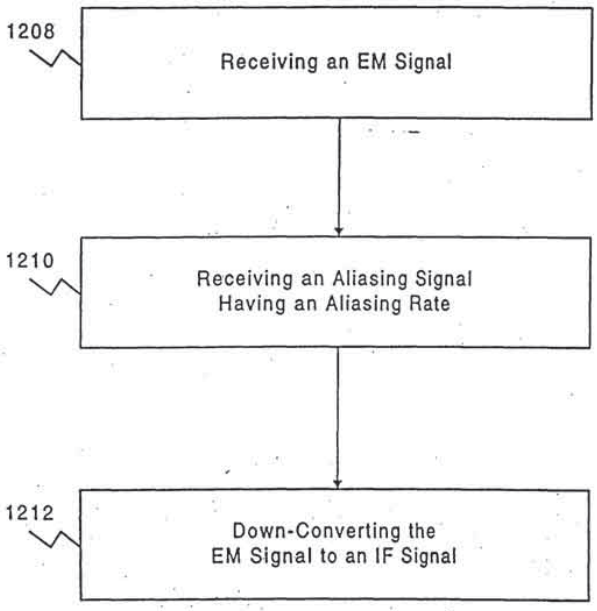
Generic Down-Converting
Flowchart

FIG. 12A

9807-09.vsd/1

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AS ORIGINALLY FIL

1207



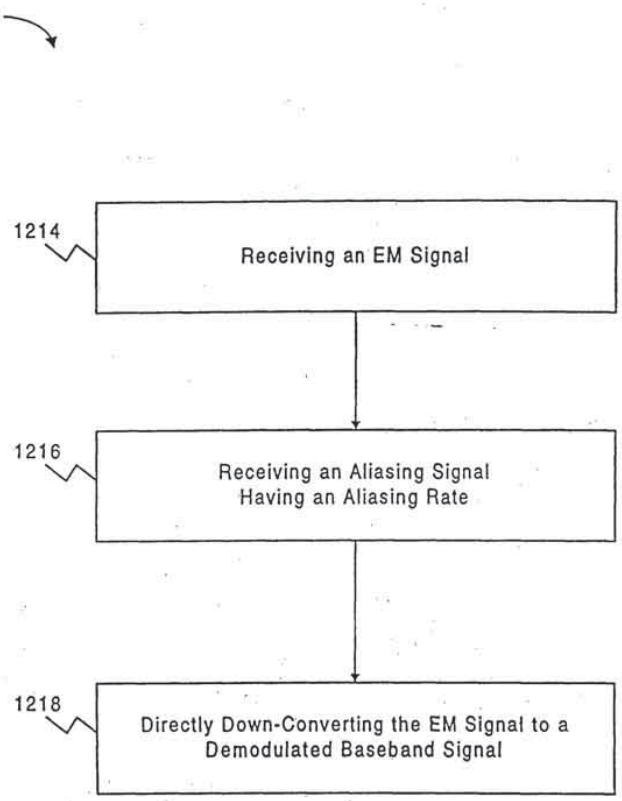
Down-Converting an
EM Signal to an IF Signal

FIG. 12B

5

9807-09.vsd/2

PRINT OF DRAWINGS
AS ORIGINALLY FIL

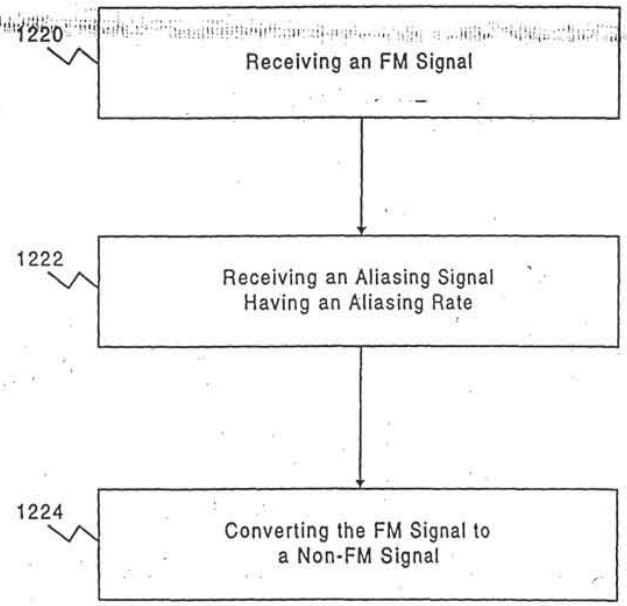


Directly Down-Converting an EM
Signal to a Demodulated Baseband Signal

FIG. 12C

9807-09.vsd/3

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AS ORIGINALLY FIL



Modulation Conversion

FIG. 12D

9807-09.vsd/4

PRINT OF DRAWINGS
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FIG. 13

PRINT OF DRAWINGS
AS ORIGINALLY FIL

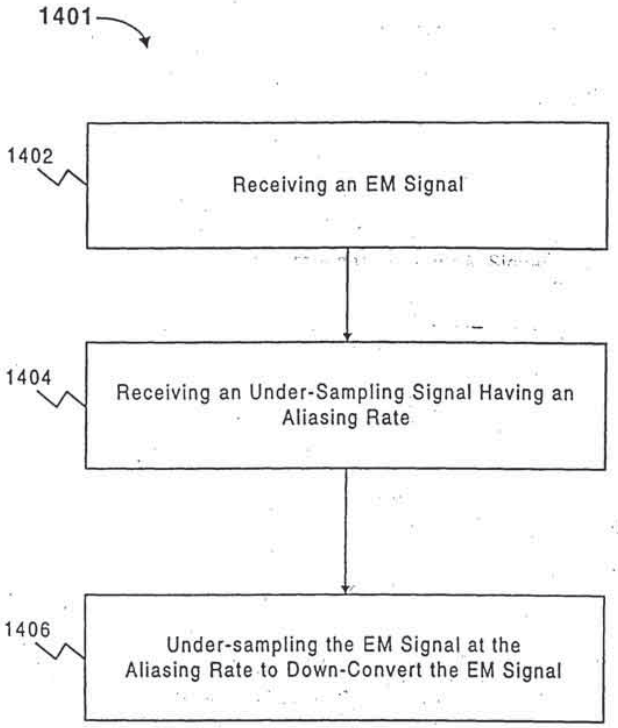


FIG. 14A

9807-09.vsd/7

PRINT OF DRAWINGS
AS ORIGINALLY FIL

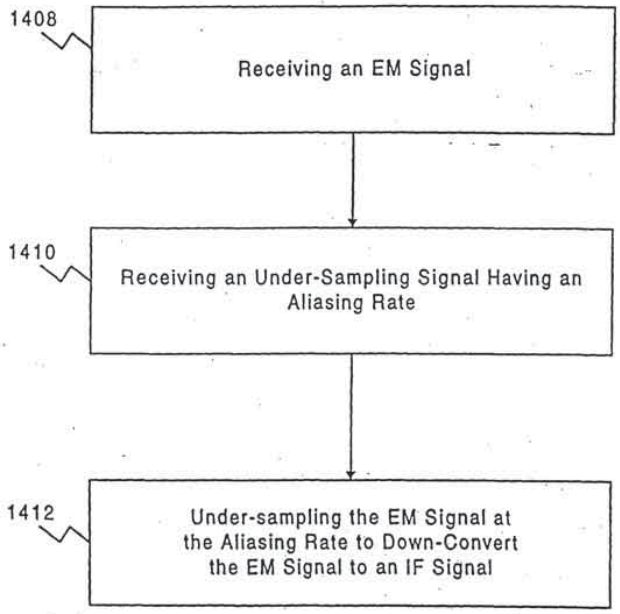


FIG. 14B

5

9807-09.vsd/8

PRINT OF DRAWINGS
AS ORIGINALLY FILED

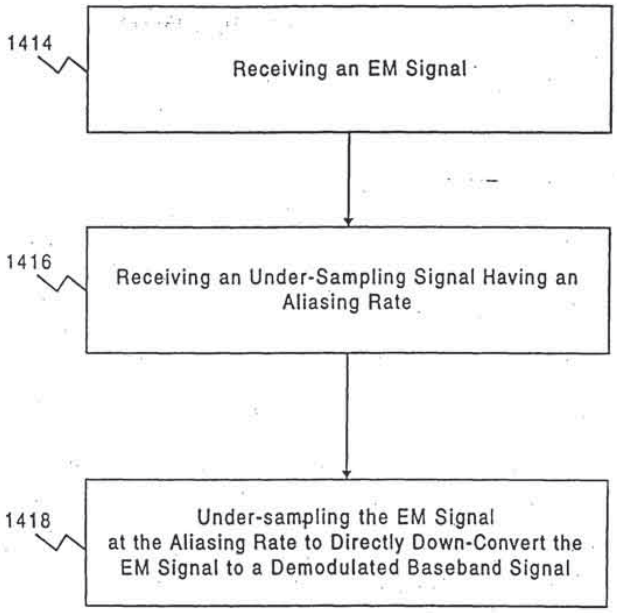


FIG. 14C

5

9807-09.vsd/9

PRINT OF DRAWINGS
AS ORIGINALLY FD

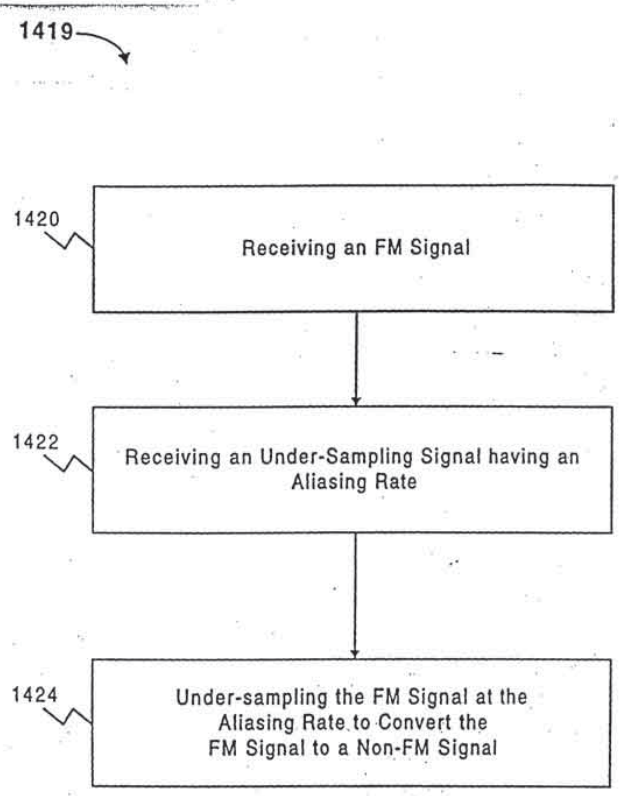
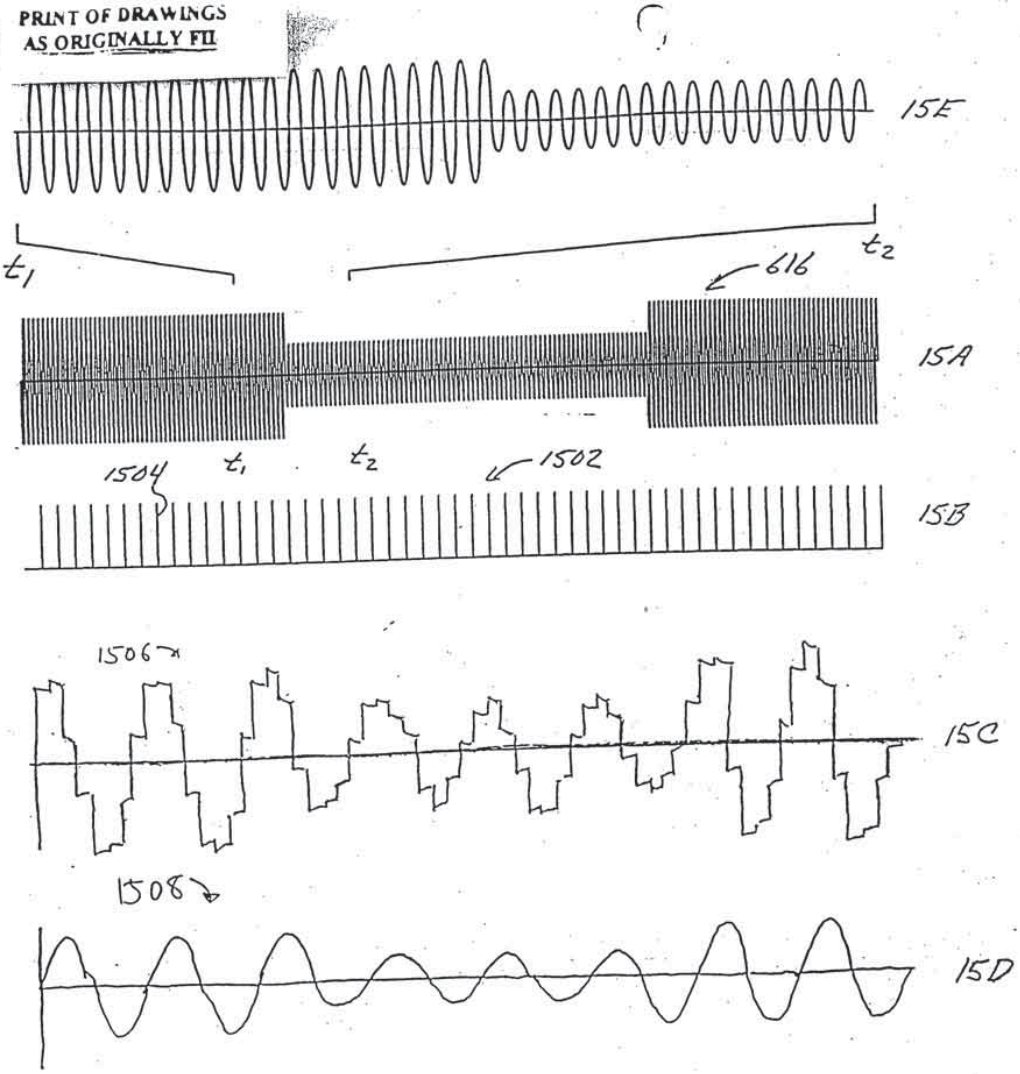


FIG. 14D

9807-09.vsd/10

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PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 16

PRINT OF DRAWINGS
AS ORIGINALLY FILED

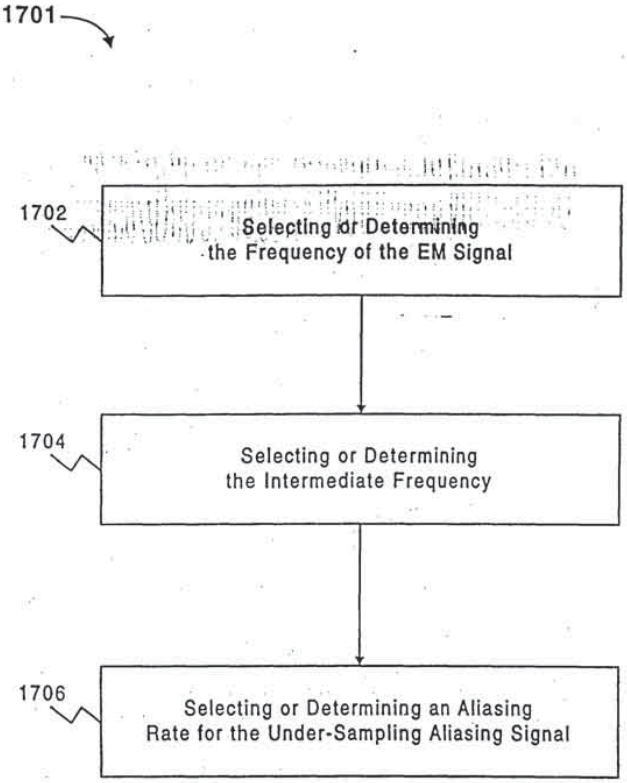


FIG. 17

9807-09.vsd/11

PRINT OF DRAWINGS
AS ORIGINALLY FILED

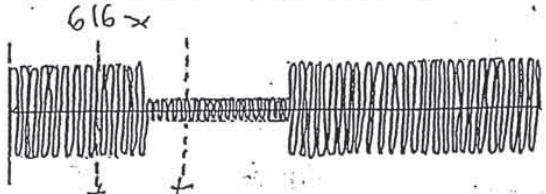


FIG. 18A

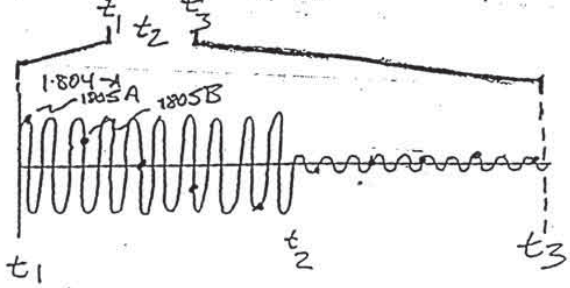


FIG. 18B

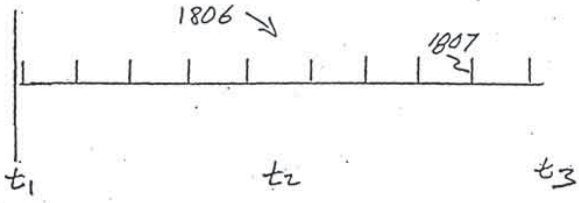


FIG. 18C

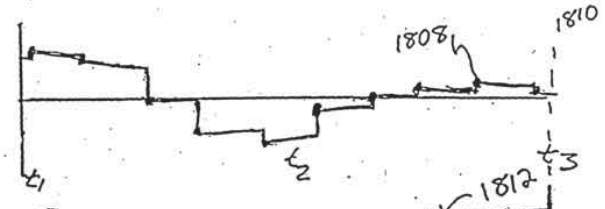


FIG. 18D

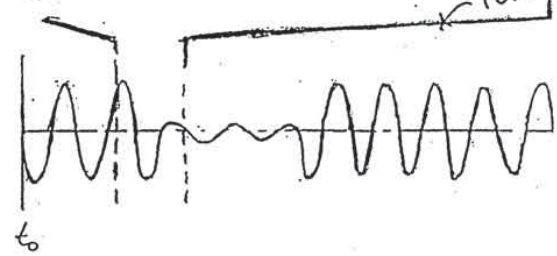


FIG. 18E

PRINT OF DRAWINGS
AS ORIGINALLY FILED

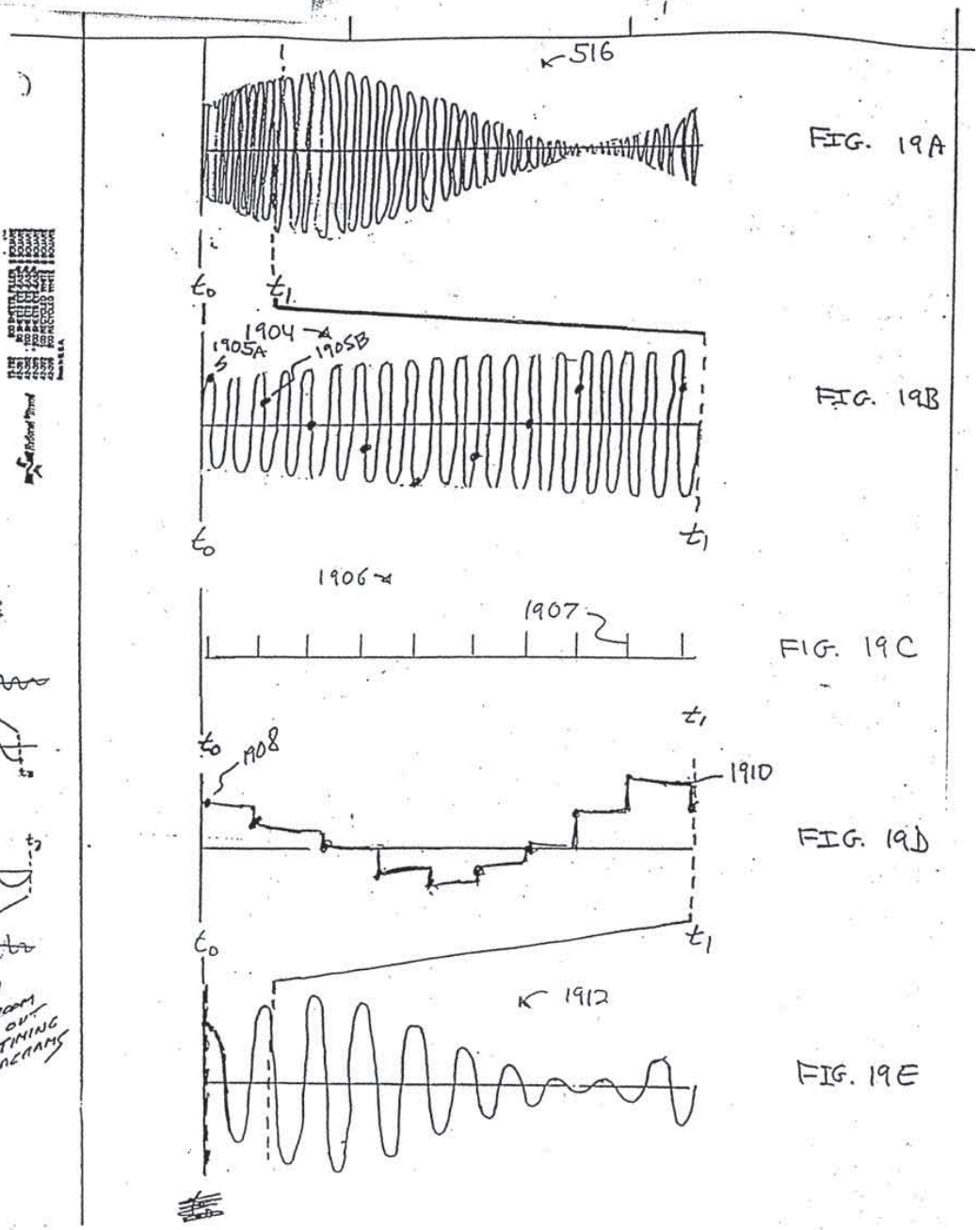


FIG. 19A

FIG. 19B

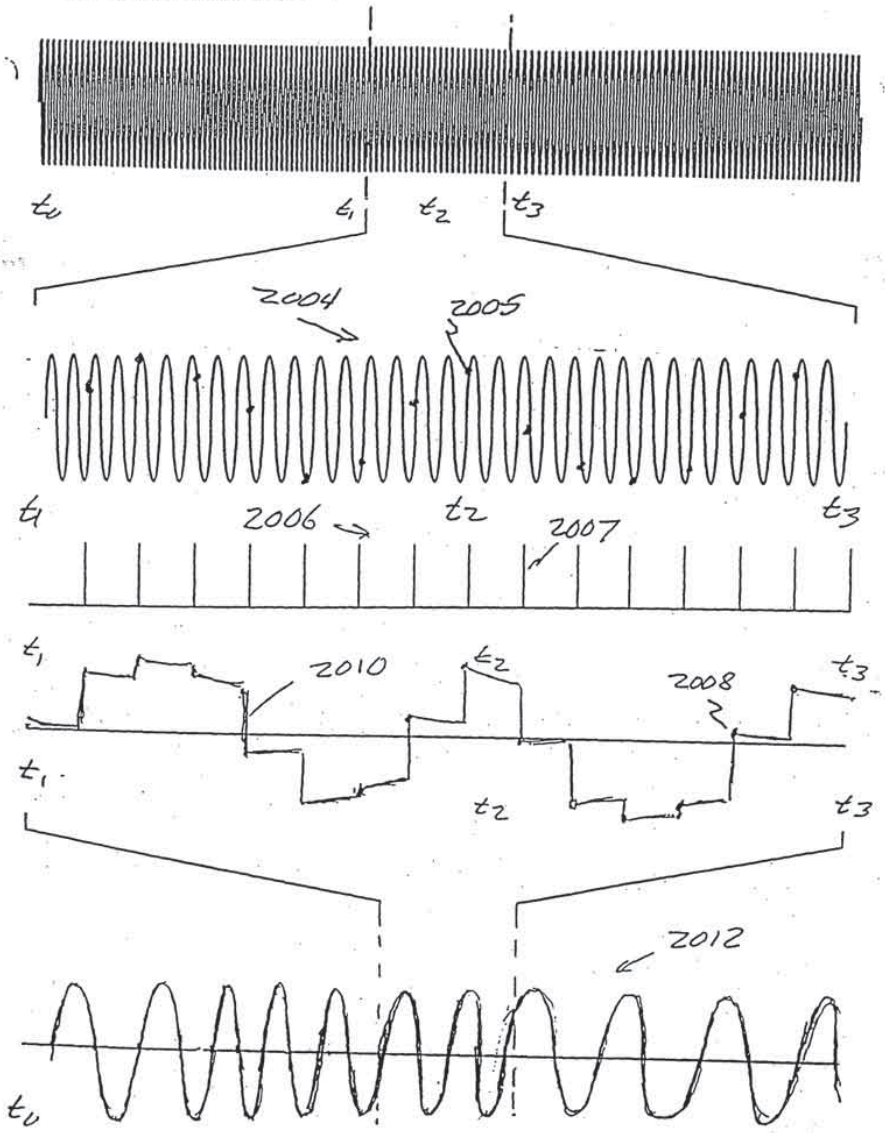
FIG. 19C

FIG. 19D

FIG. 19E

DRAWING SHEET 25 OF 25

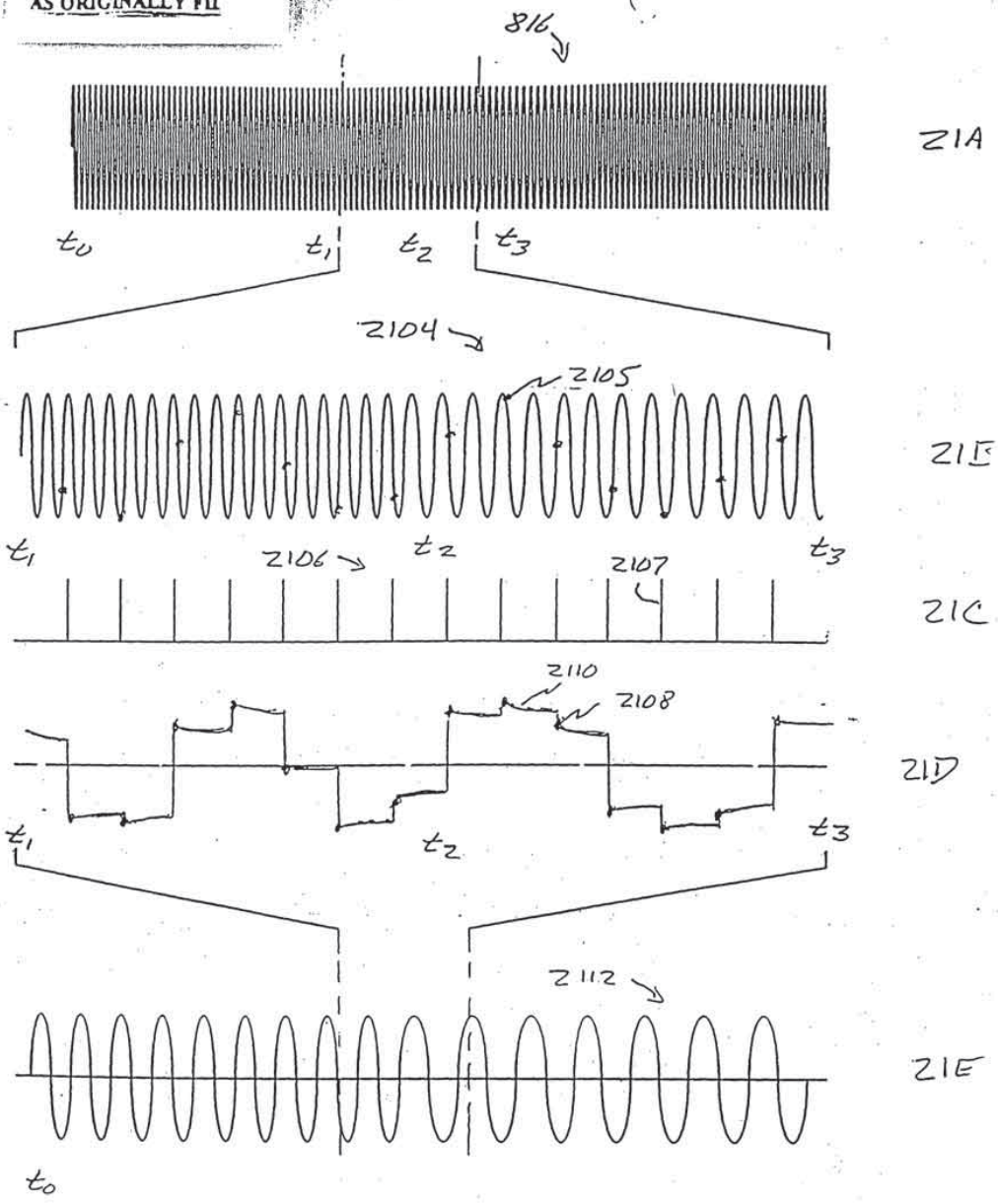
PRINT OF DRAWINGS
AS ORIGINALLY FILED



5

ParkerVision Confidential
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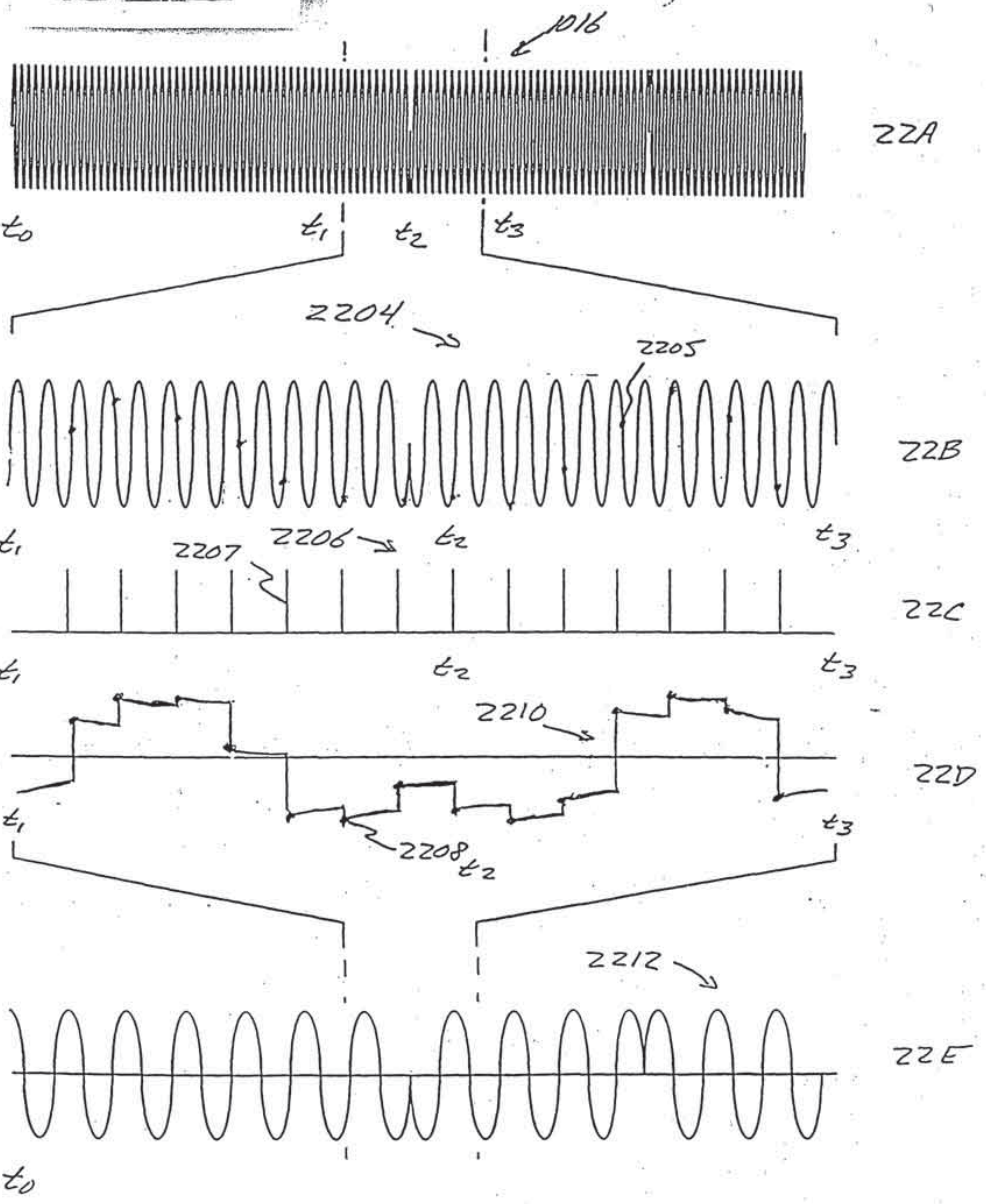
PRINT OF DRAWINGS
AS ORIGINALLY FIL



5

ParkerVision Confidential
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Filename: digital-fm1.vsd

PRINT OF DRAWINGS
AS ORIGINALLY FIL



ParkerVision Confidential
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Filename: digital-pm1.vsd

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AS ORIGINALLY FIL

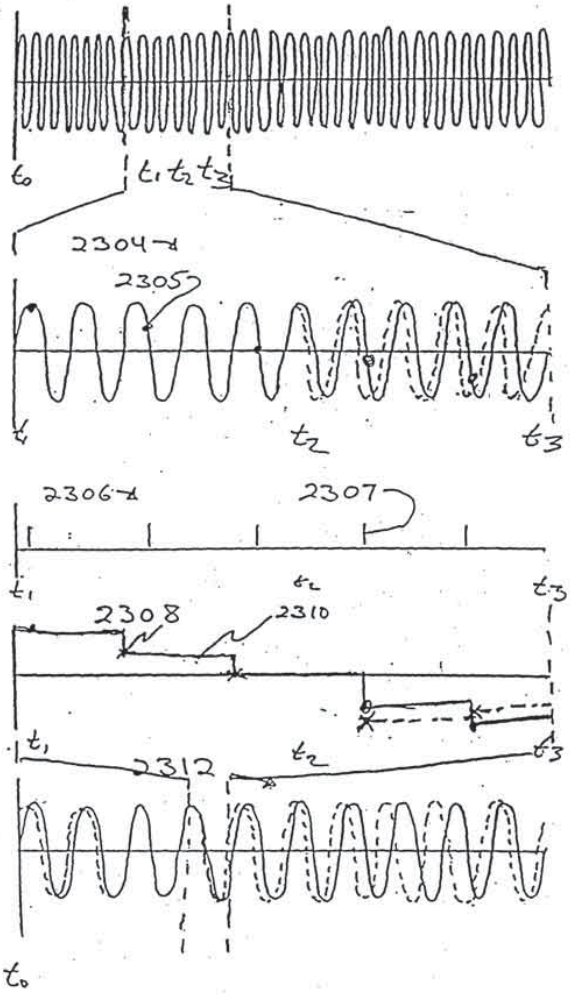


FIG. 23A

FIG. 23B

FIG. 23C

FIG. 23D

FIG. 23E

PRINT OF DRAWINGS
AS ORIGINALLY FILED

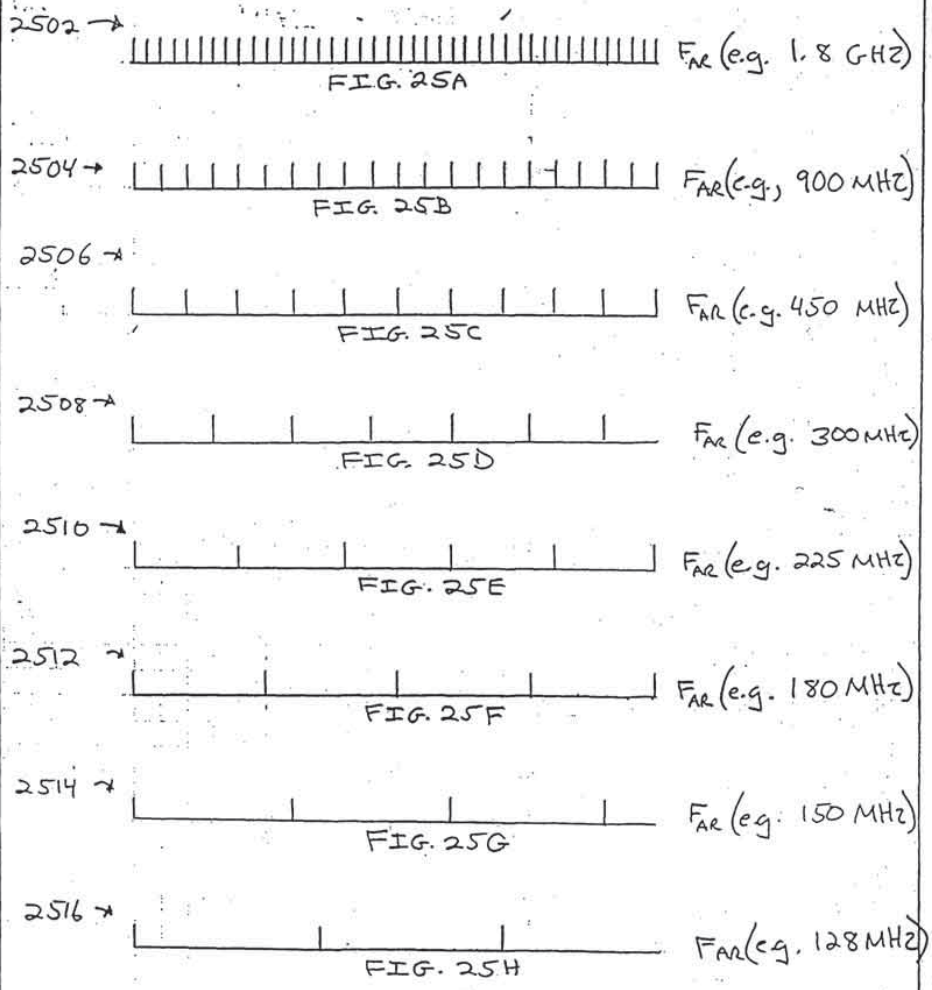
FIG. 24A

PRINT OF DRAWINGS
AS ORIGINALLY FII

FIG. 24C

FIG. 24B

PRINT OF DRAWINGS
AS ORIGINALLY FIL



PRINT OF DRAWINGS
AS ORIGINALLY FII

FIG. 26A

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 26B

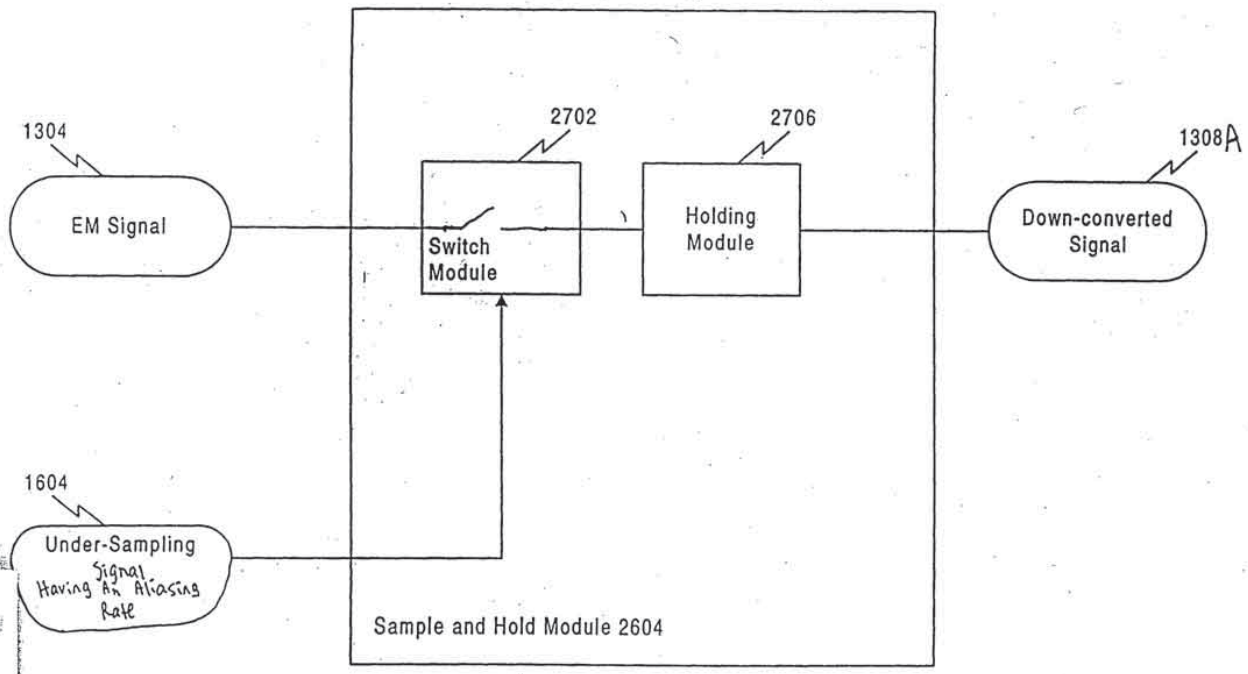


FIG. 27

PRINT OF DRAWINGS AS ORIGINALLY FIL

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PRINT OF DRAWINGS
AS ORIGINALLY FII

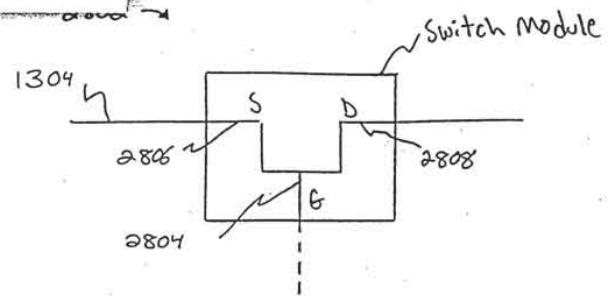


FIG. 28A

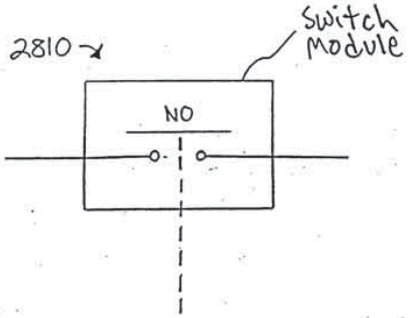


FIG. 28B

PRINT OF DRAWINGS
AS ORIGINALLY FII

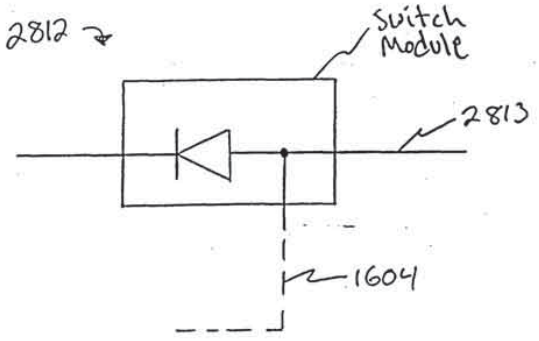


FIG. 28C

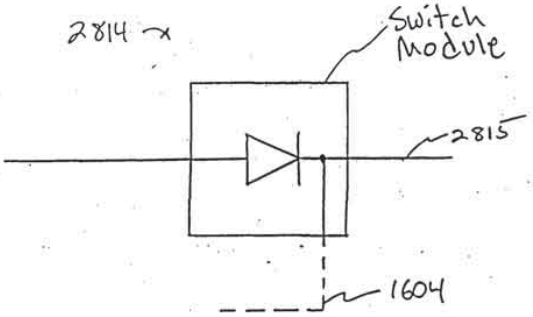


FIG. 28D

PRINT OF DRAWINGS
AS ORIGINALLY FII

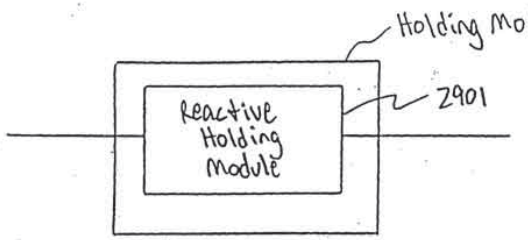


FIG. 29A

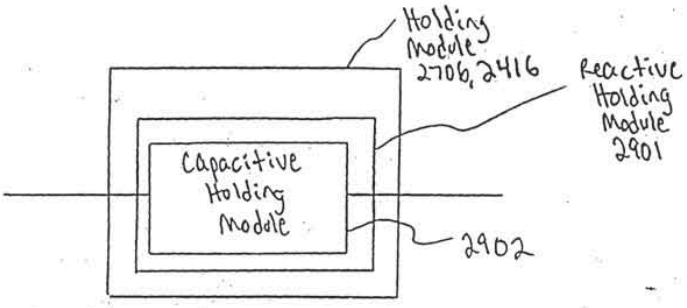


FIG. 29B

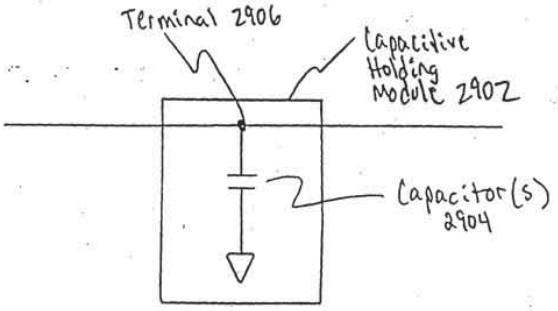


FIG. 29C

PRINT OF DRAWINGS
AS ORIGINALLY FII

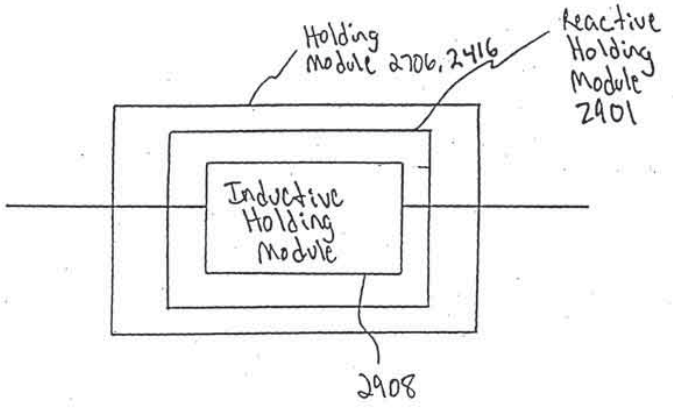


FIG. 29D

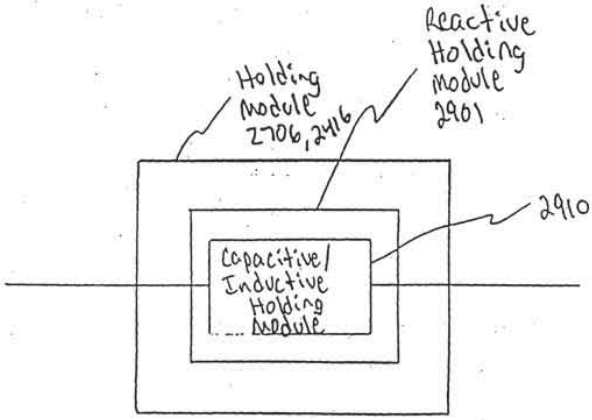


FIG. 29E

PRINT OF DRAWINGS
AS ORIGINALLY FIL

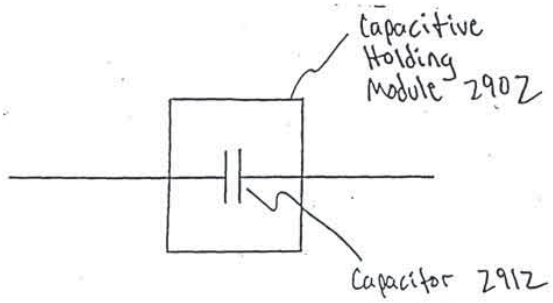
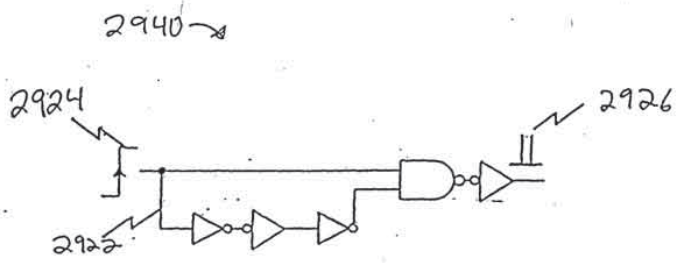


FIG. 29F

PRINT OF DRAWINGS
AS ORIGINALLY FIL

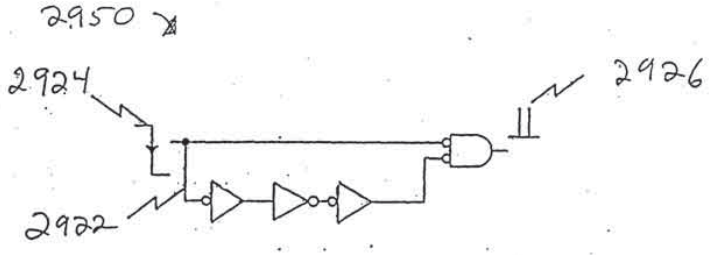
FIG. 29G

PRINT OF DRAWINGS
AS ORIGINALLY FIL



A. rising edge pulse generator

FIG. 29H



B. falling-edge pulse generator

FIG. 29I

PRINT OF DRAWINGS
AS ORIGINALLY FIL

-substantial equivalence in logic only is necessary.
-if shown for polarity consistency with
ckt examples described elsewhere.

FIG 29

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG 29K

29L

PRINT OF DRAWINGS
AS ORIGINALLY FII

FIG. 30

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 31A

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 31B-C

PRINT OF DRAWINGS
AS ORIGINALLY FIL

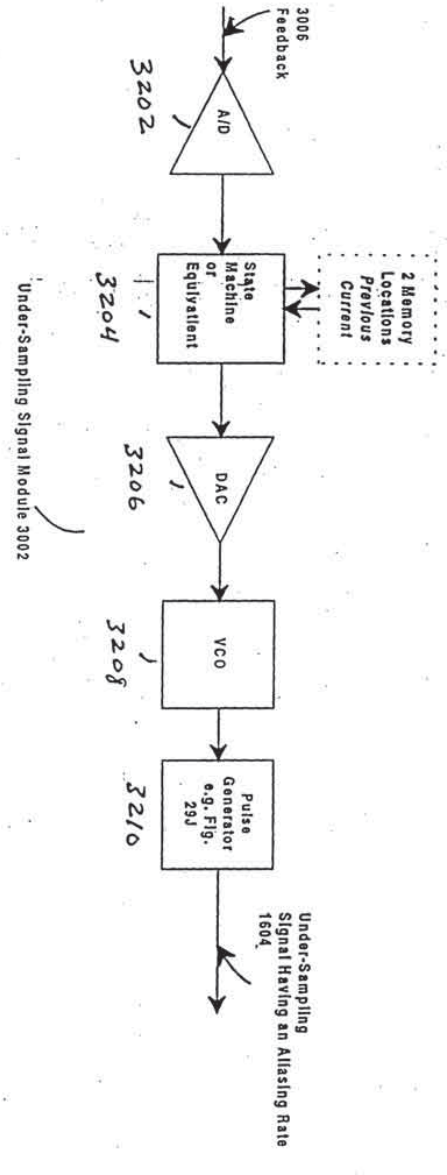
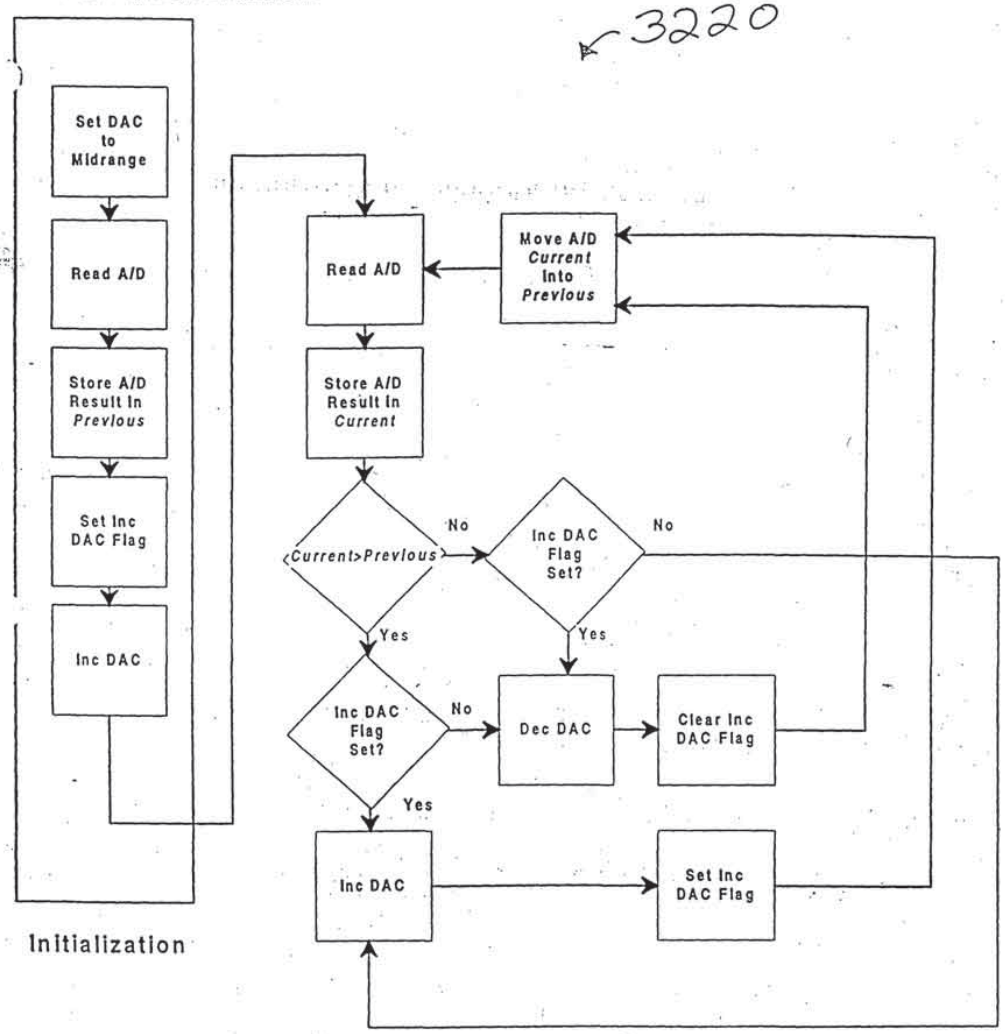


FIG 32A

PRINT OF DRAWINGS
AS ORIGINALLY FIL

3220

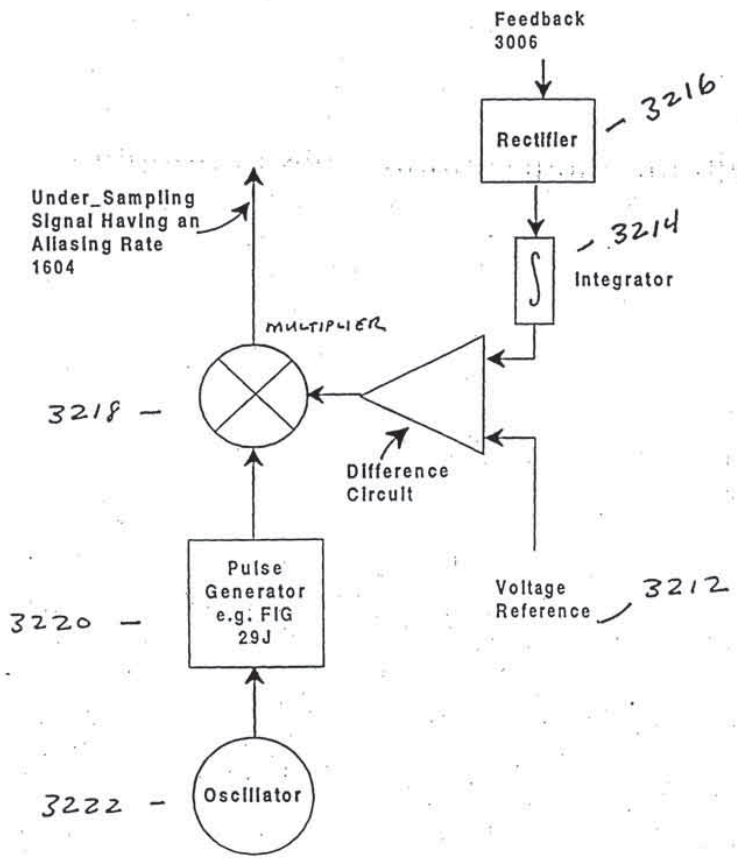


State Machine Flowchart

FIG. 32B

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PRINT OF DRAWINGS
AS ORIGINALLY FIL



Energy Transfer Signal Module 3002

FIG. 32C

PRINT OF DRAWINGS
AS ORIGINALLY FIL

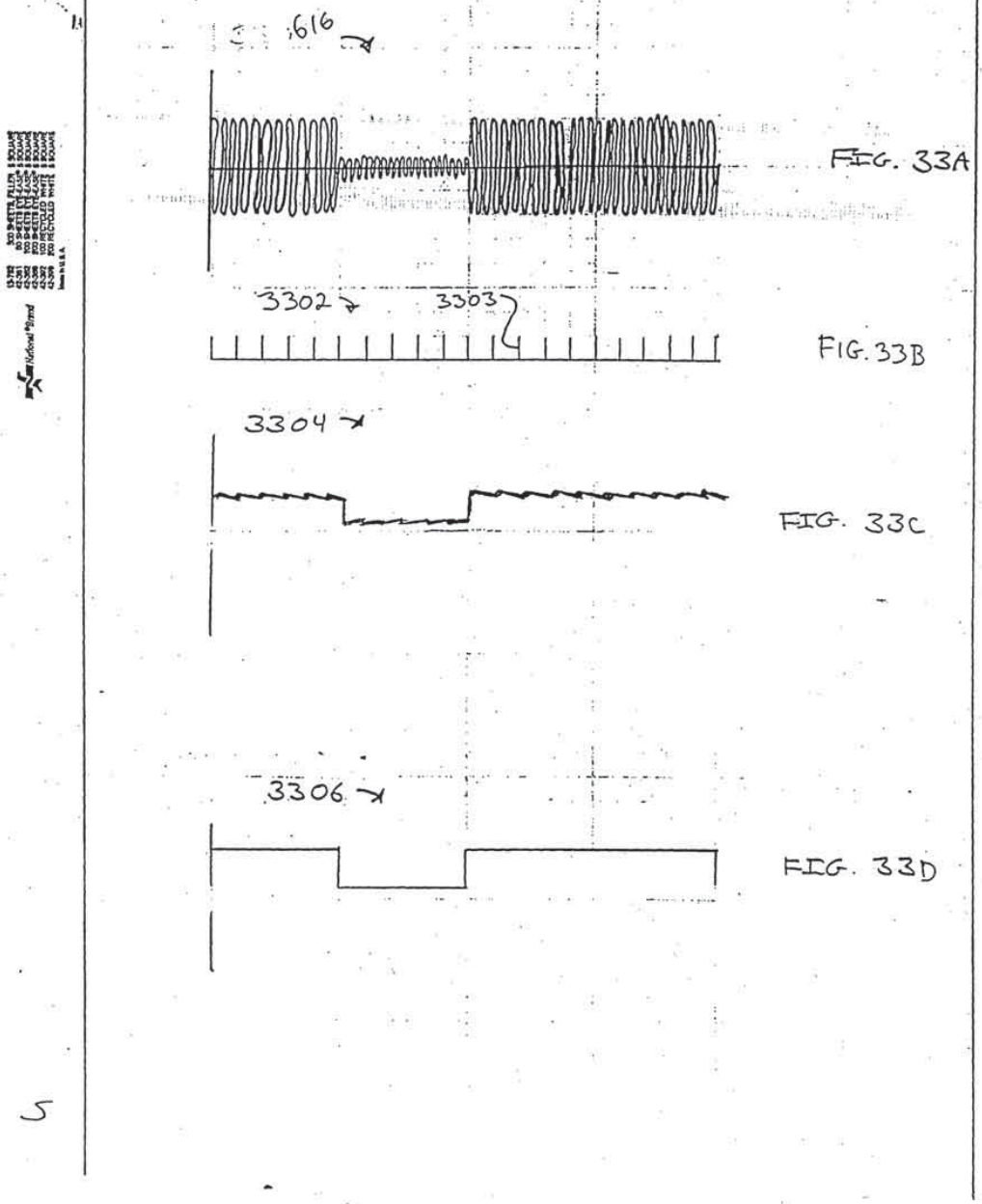


FIG. 33A

FIG. 33B

FIG. 33C

FIG. 33D

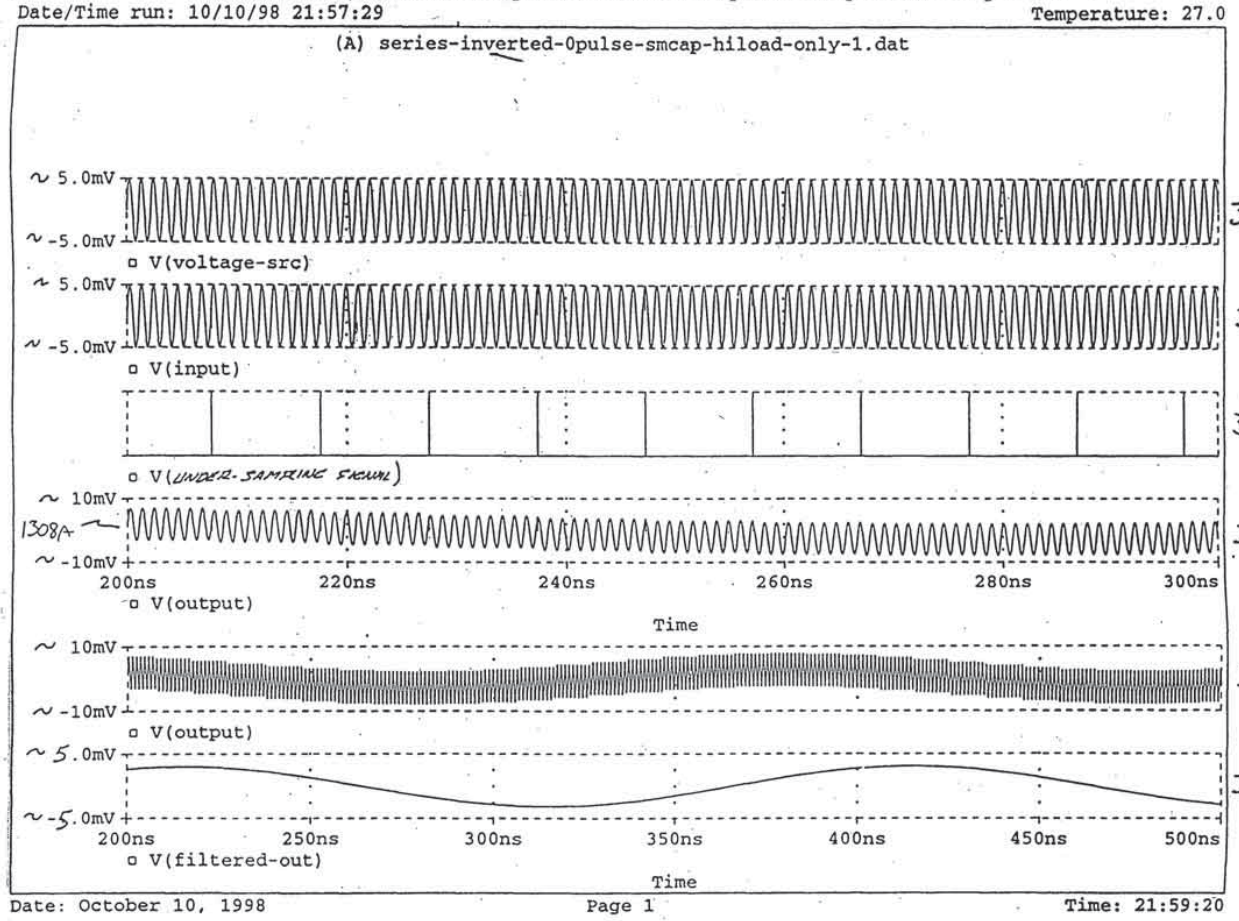


FIG 34

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PRINT OF DRAWINGS AS ORIGINALLY FIL

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PRINT OF DRAWINGS
AS ORIGINALLY FII

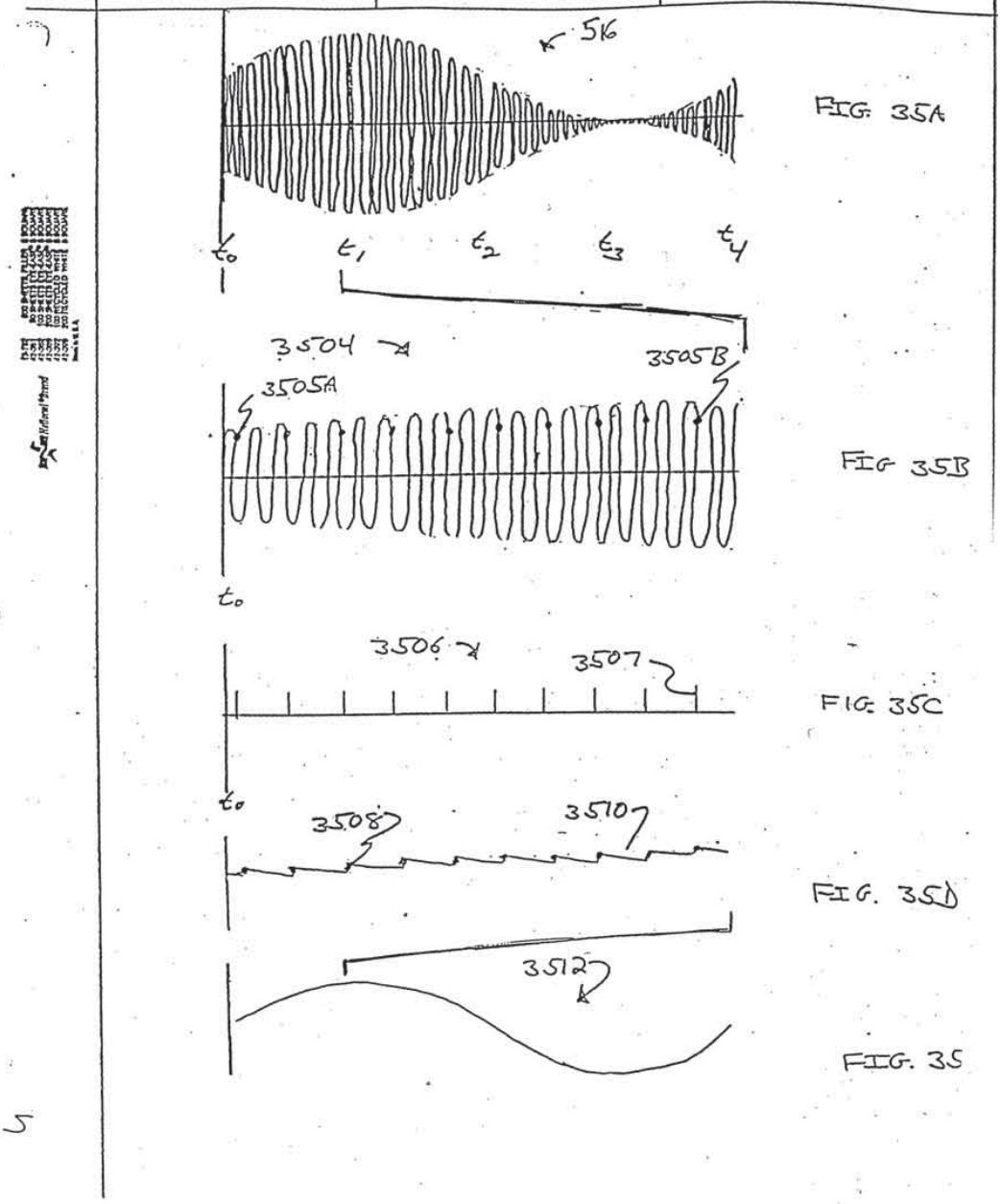


FIG. 35A

FIG 35B

FIG. 35C

FIG. 35D

FIG. 35

PRINT OF DRAWINGS
AS ORIGINALLY FII

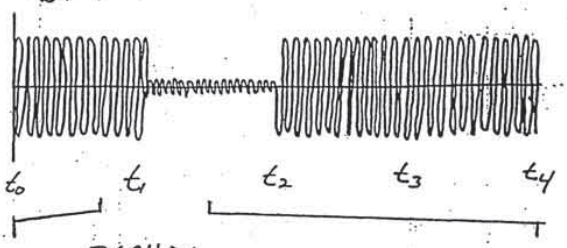


FIG. 36A

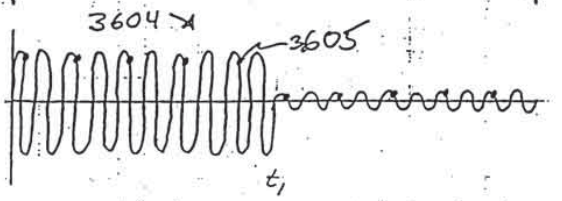


FIG. 36B

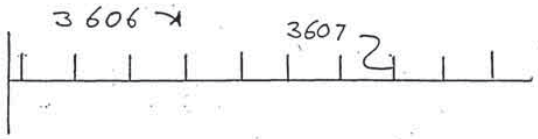


FIG. 36C

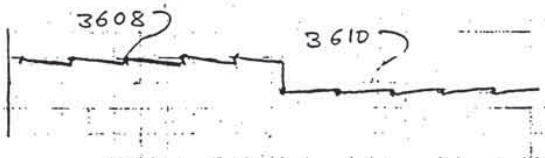


FIG. 36D

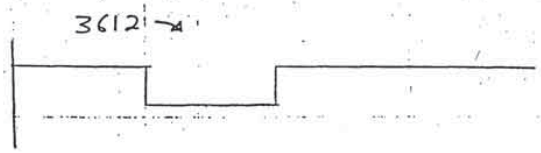


FIG. 36E

PRINT OF DRAWINGS
AS ORIGINALLY FIL

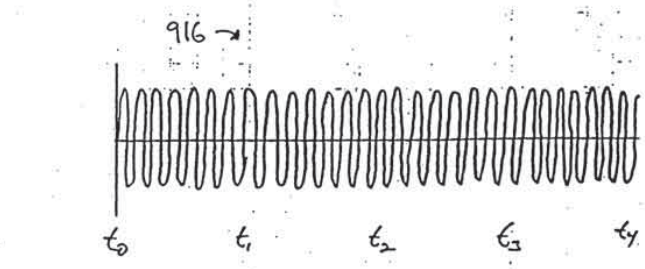


FIG. 37A

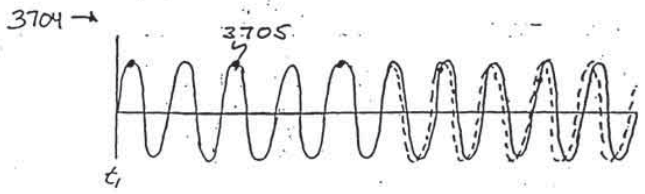


FIG. 37B

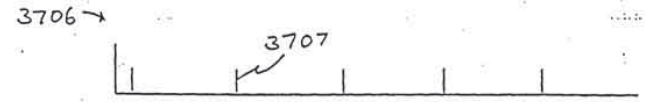


FIG. 37C

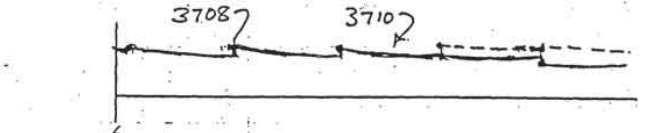


FIG. 37D

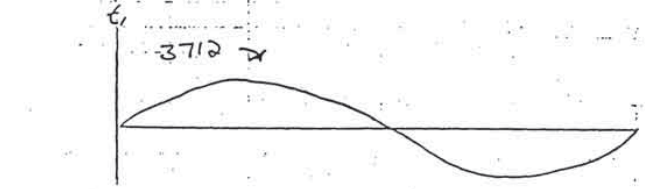


FIG. 37E

PRINT OF DRAWINGS
AS ORIGINALLY FILED

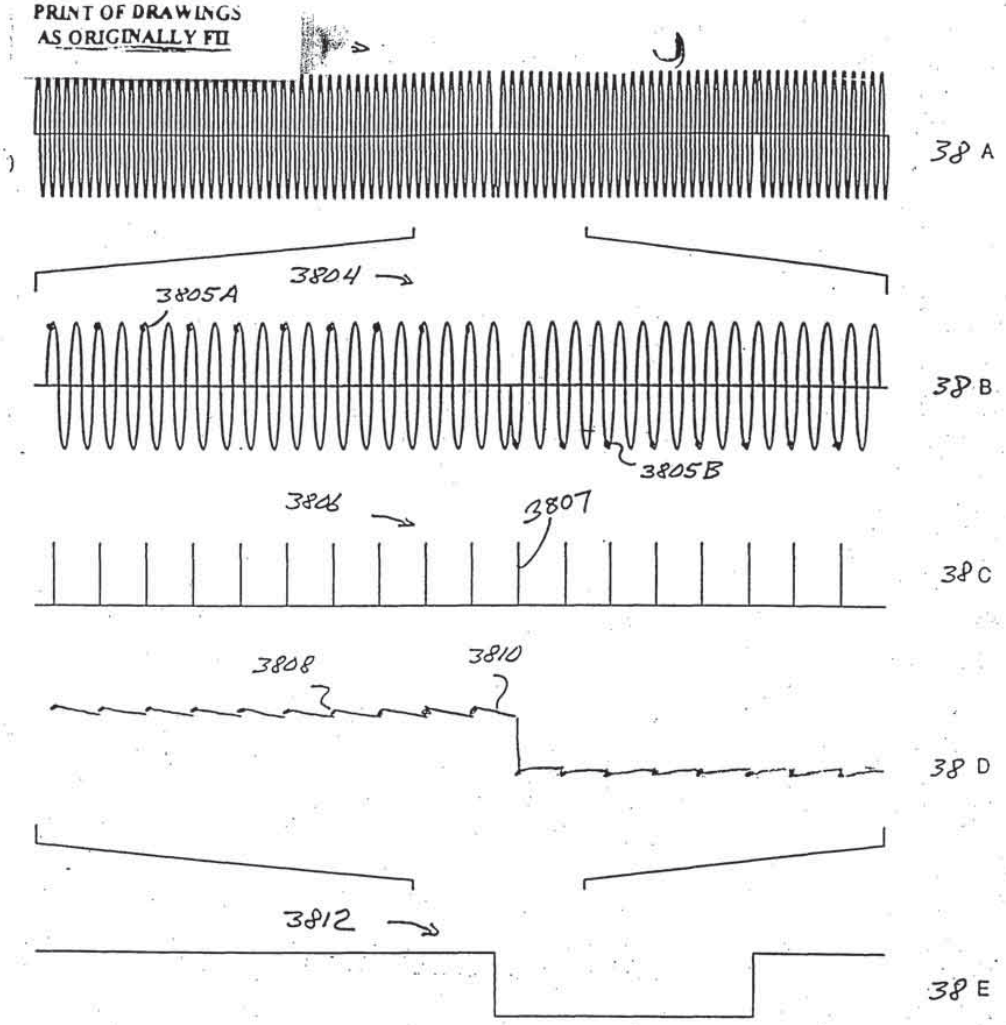


FIG 38AE

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

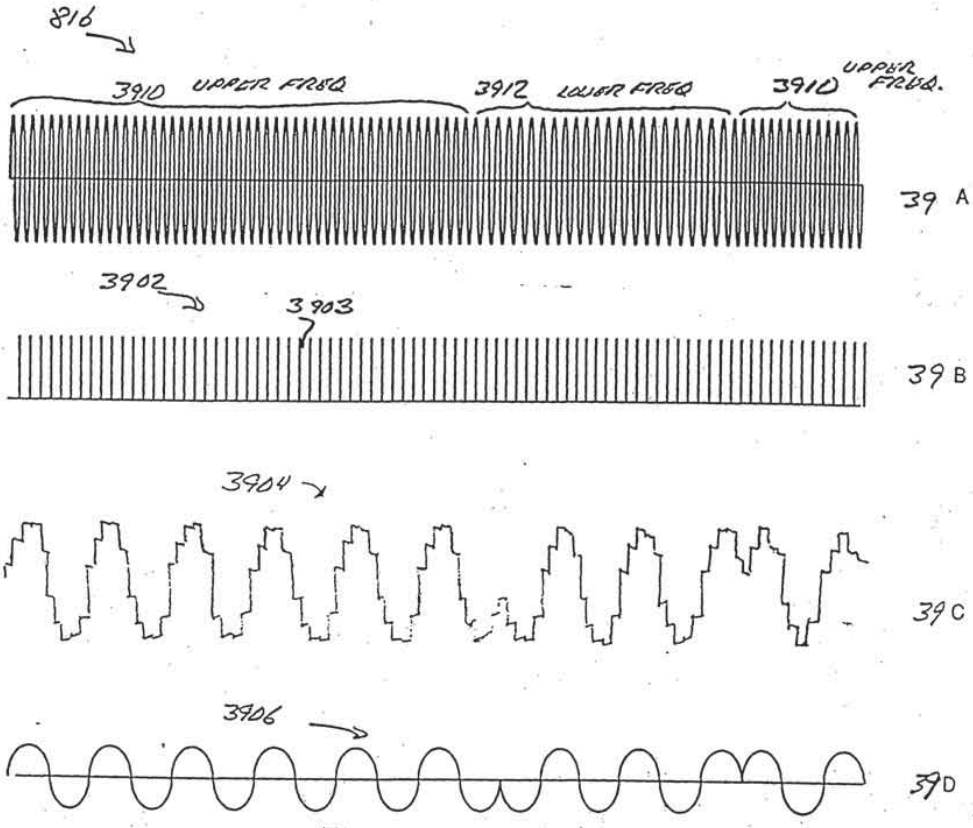


FIG 39A-D

PRINT OF DRAWINGS
AS ORIGINALLY FIL

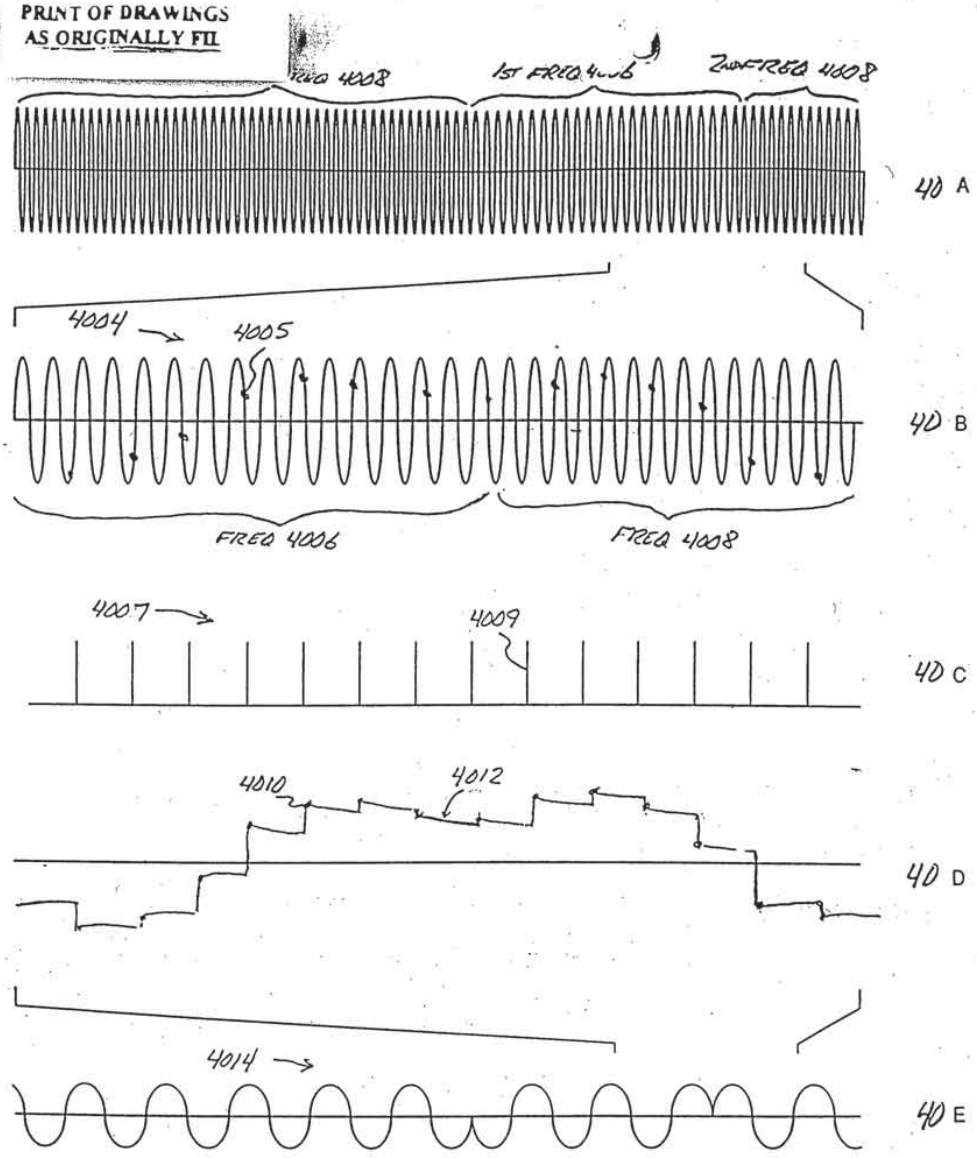


FIG 40A-E

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

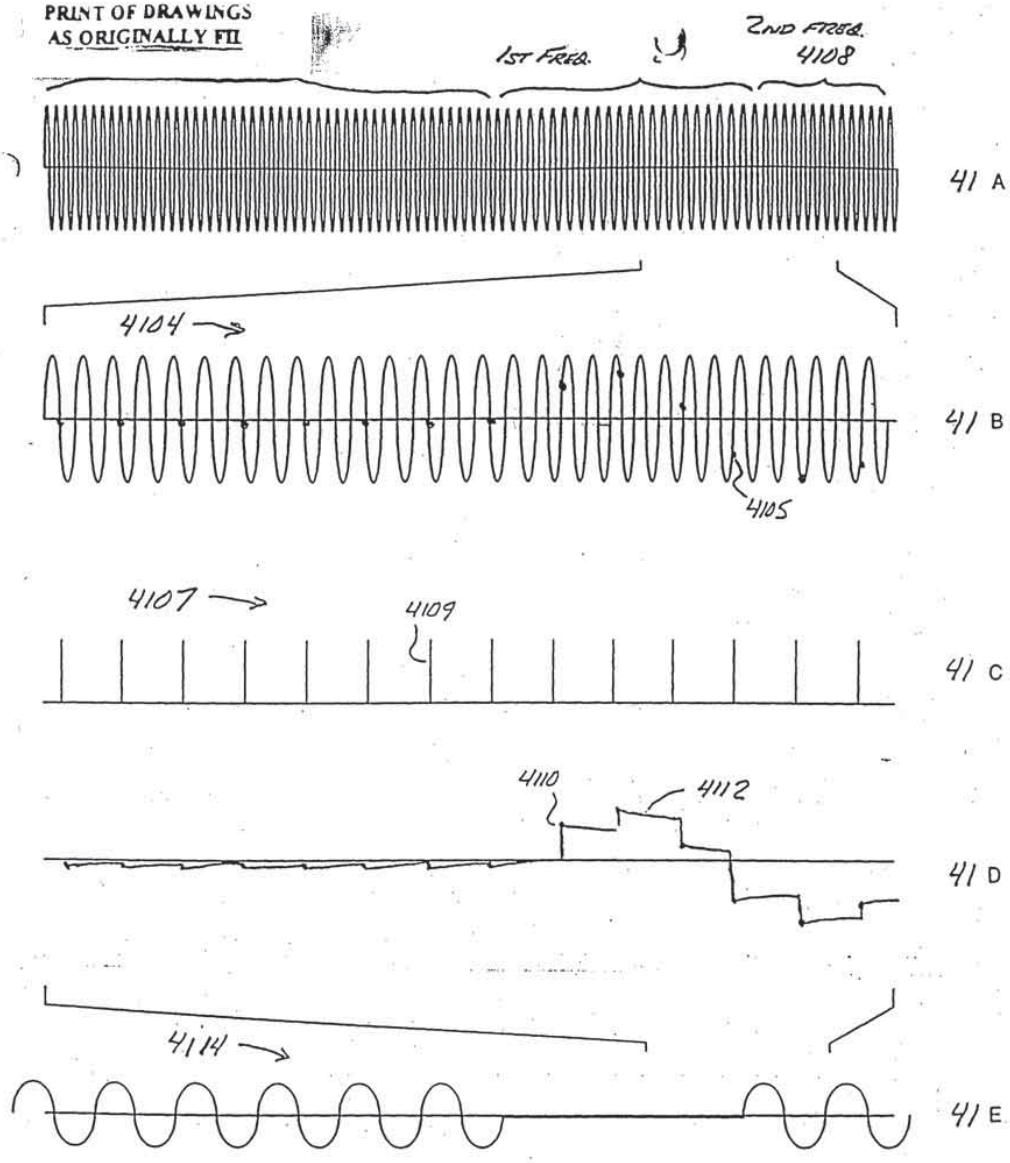


FIG 41 A-E

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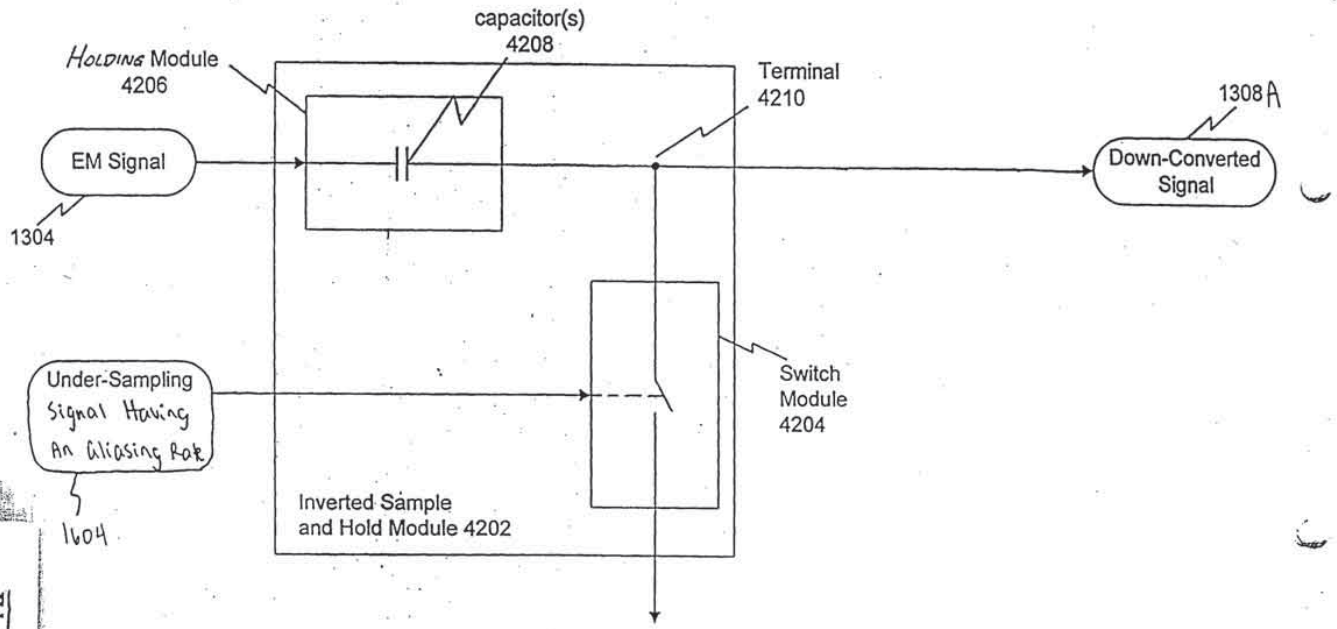


FIG. 42

PRINT OF DRAWINGS
AS ORIGINALLY FILED

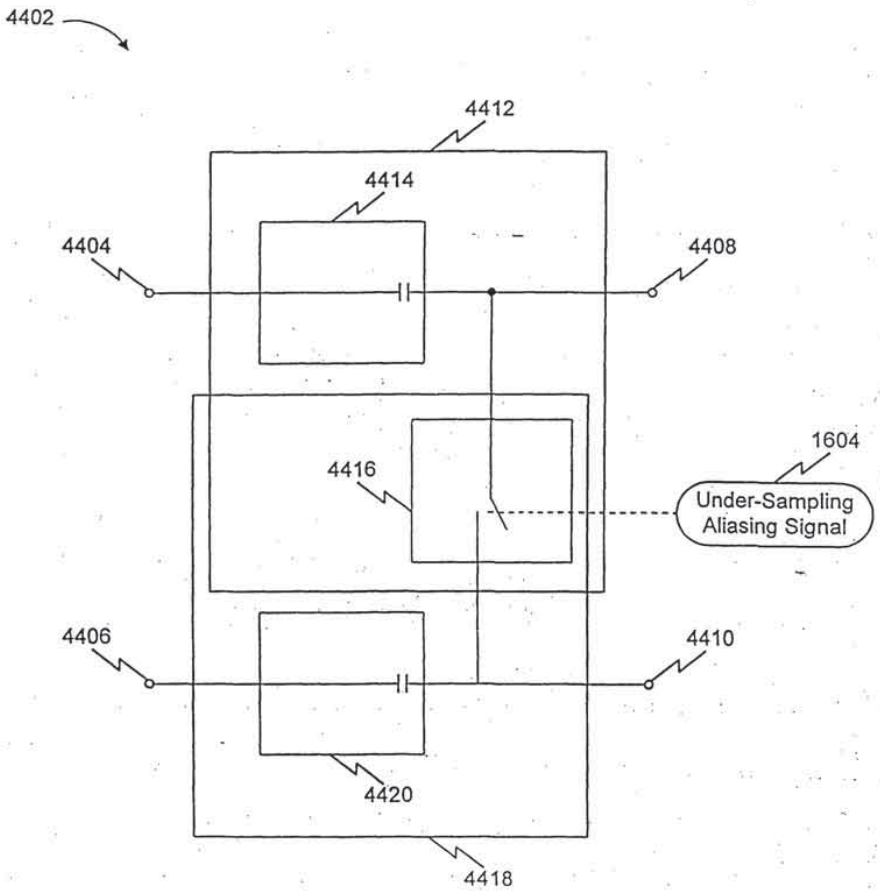
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PRINT OF DRAWINGS
AS ORIGINALLY FIL

$$\Delta q(t) = 2 \cdot C \cdot A \cdot \sin\left(\frac{1}{2} \cdot T\right) \cdot \cos\left(t - \frac{1}{2} \cdot T\right)$$

FIG. 43

PRINT OF DRAWINGS
AS ORIGINALLY FII



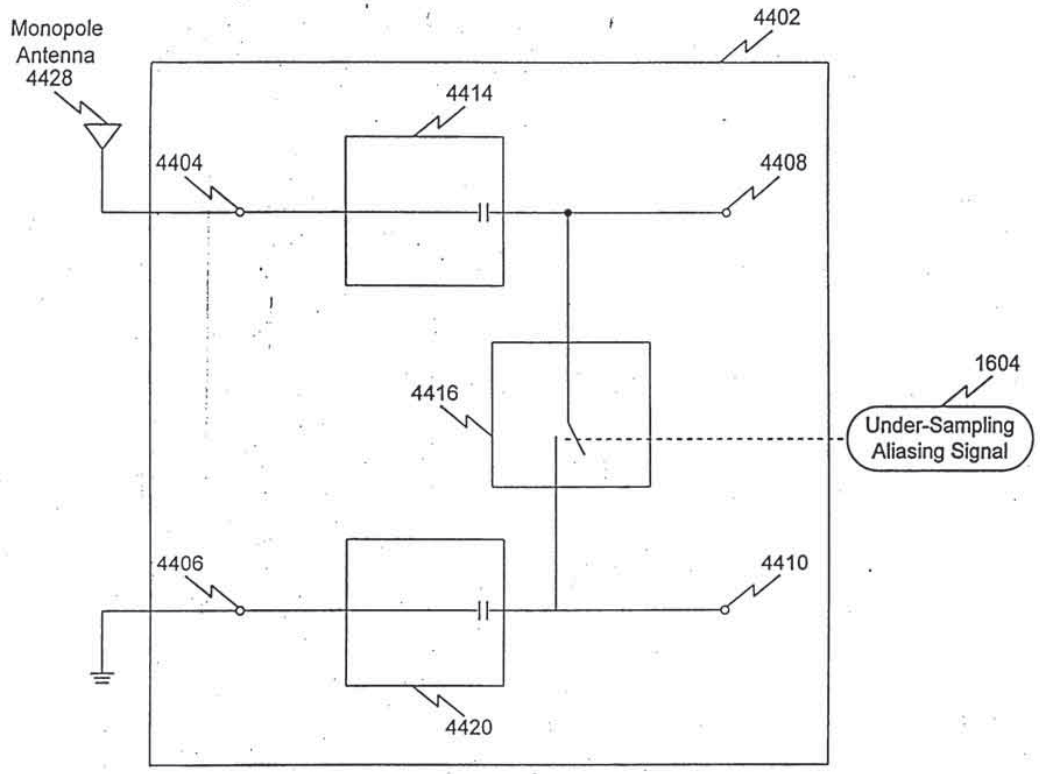
Differential Configuration

FIG. 44A

9807-10.vsd/22

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FIG. 44B



Single Input to Differential Output

FIG. 44C

PRINT OF DRAWINGS
AS ORIGINALLY FIL

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PRINT OF DRAWINGS
AS ORIGINALLY FILED

Differential Input to Single Output

FIG. 44D

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Example Input/Output Circuitry

FIG. 44E

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AS ORIGINALLY FILED

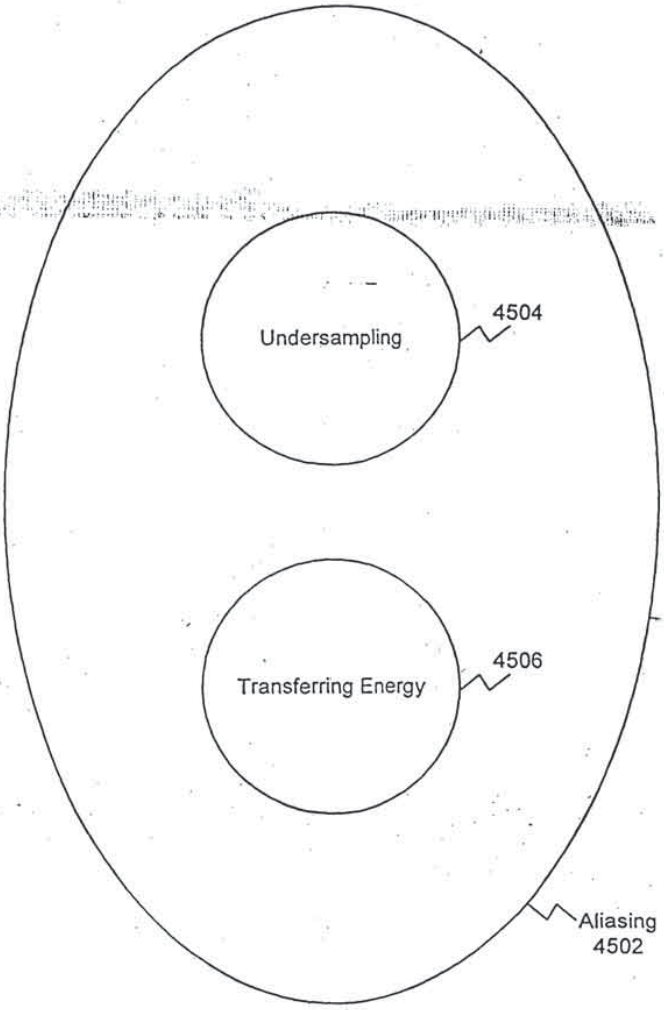


FIG. 45A

PRINT OF DRAWINGS
AS ORIGINALLY FIL

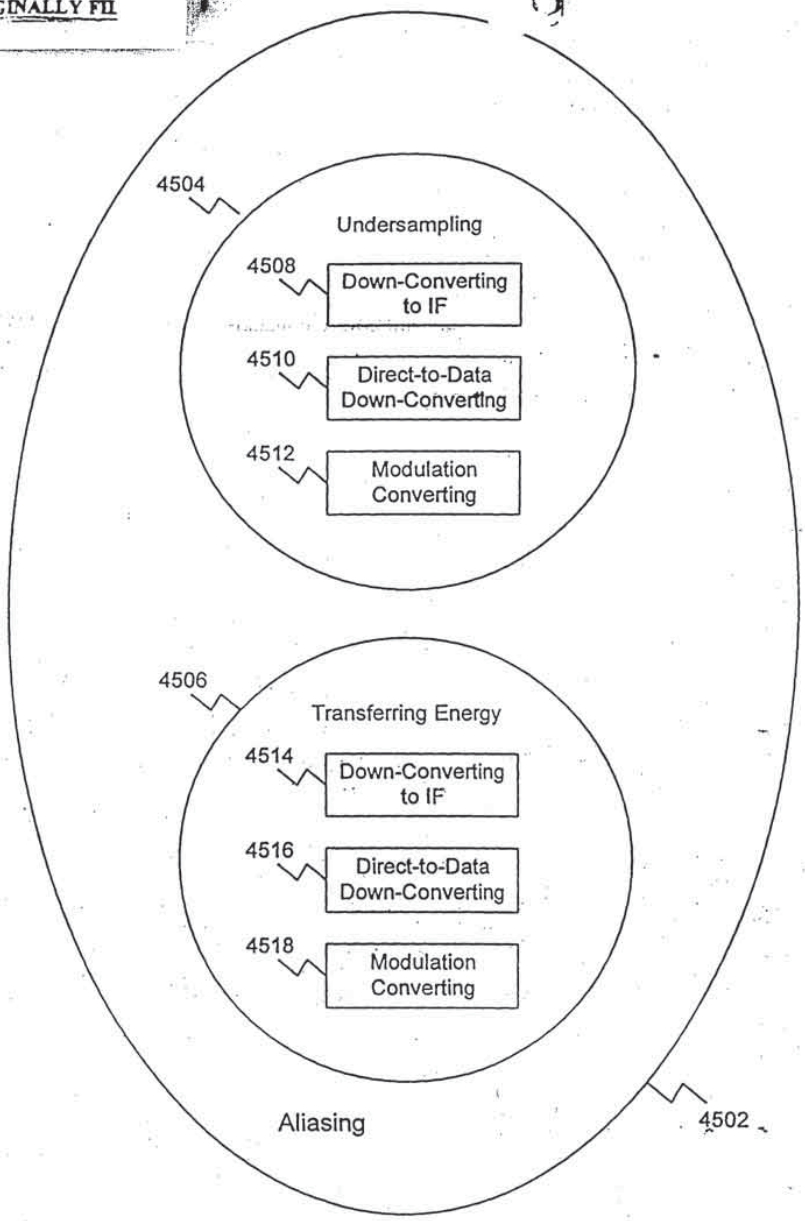


FIG. 45B

PRINT OF DRAWINGS
AS ORIGINALLY FII

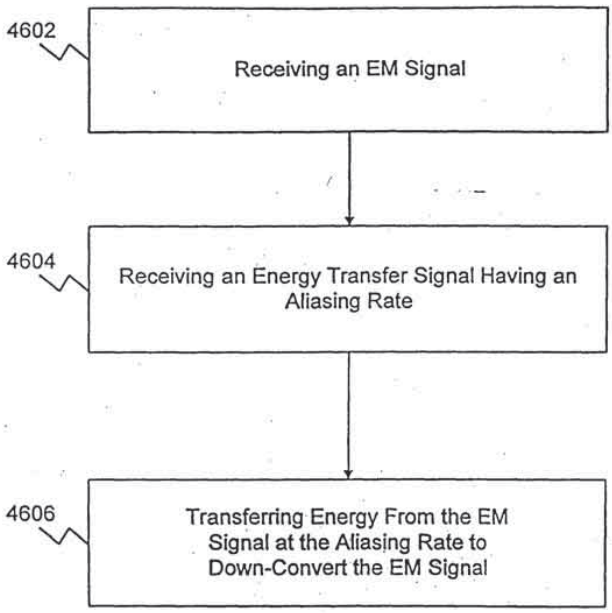


FIG. 46A

9807-09.vsd/12

PRINT OF DRAWINGS
AS ORIGINALLY FILED

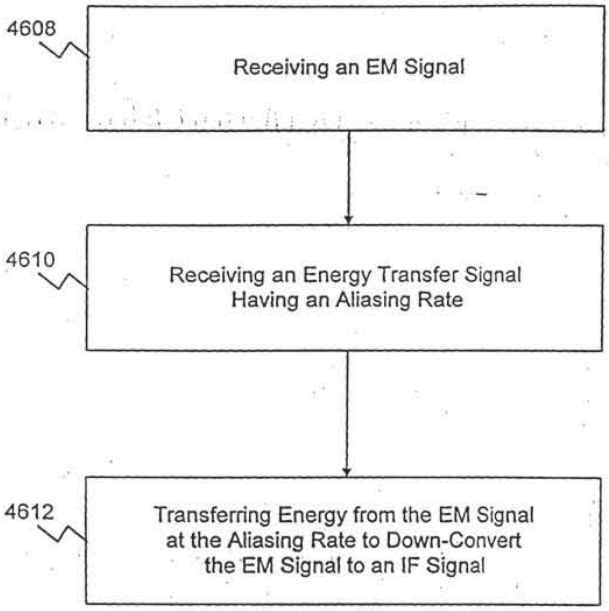


FIG. 46B

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9807-09.vsd/13

PRINT OF DRAWINGS
AS ORIGINALLY FILED

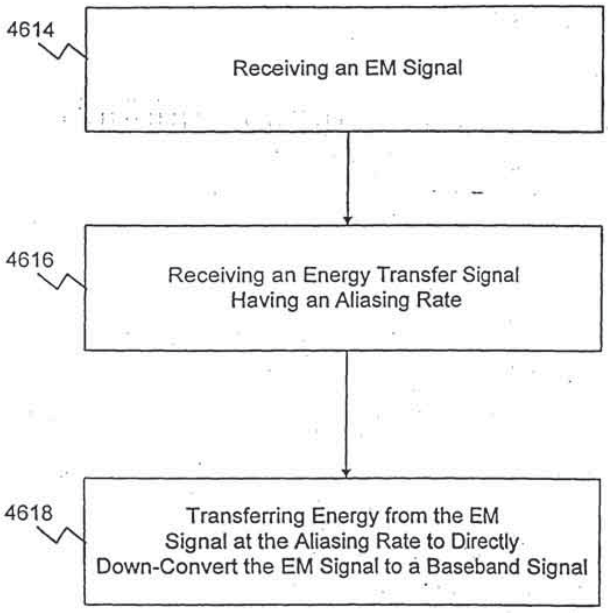


FIG. 46C

9807-09.vsd/14

PRINT OF DRAWINGS
AS ORIGINALLY FIL

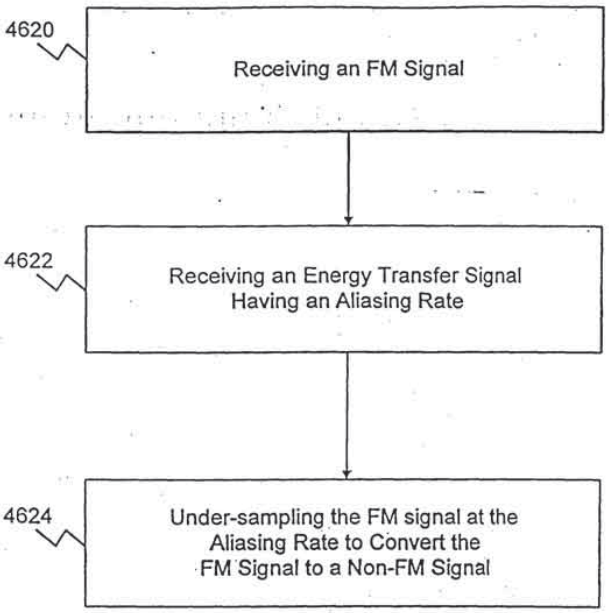


FIG. 46D

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9807-09.vsd/15

PRINT OF DRAWINGS AS ORIGINALLY FD.

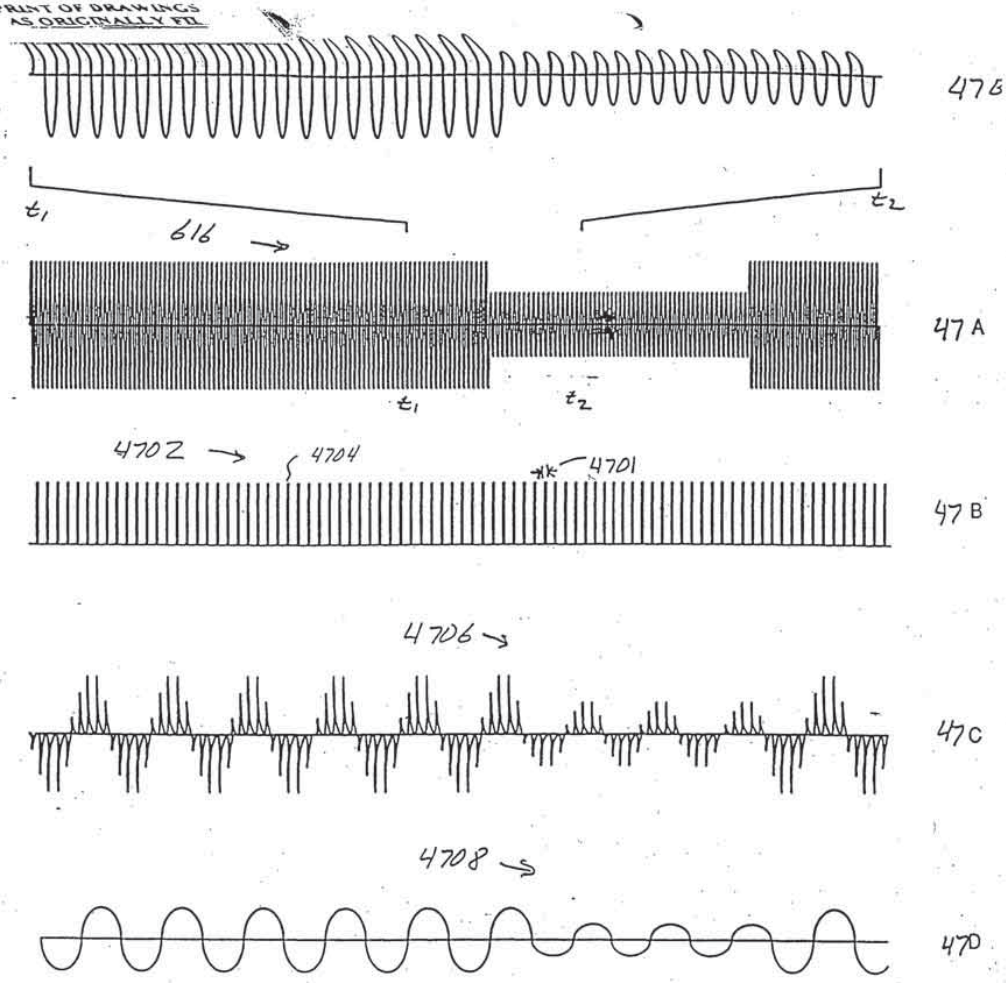


FIG 47A-E

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PRINT OF DRAWINGS
AS ORIGINALLY FII

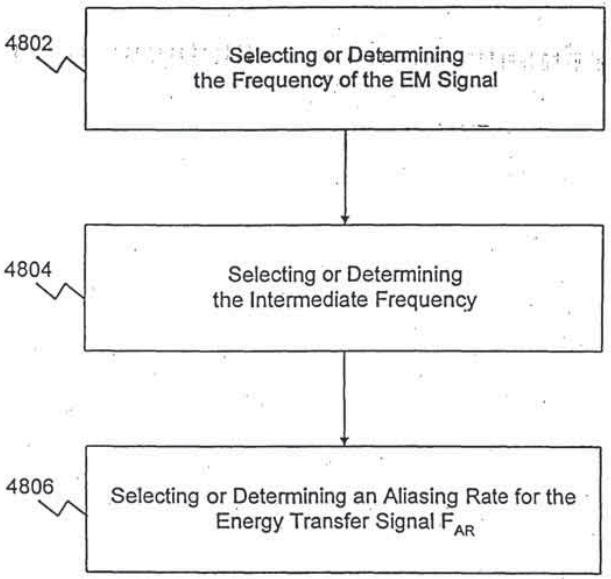


FIG. 48

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9807-09.vsd/16

PRINT OF DRAWINGS
AS ORIGINALLY FIL

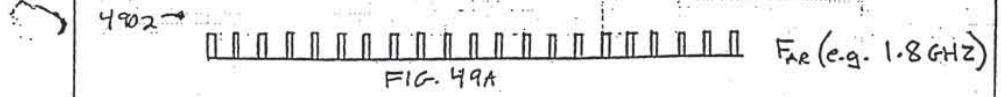


FIG. 49A

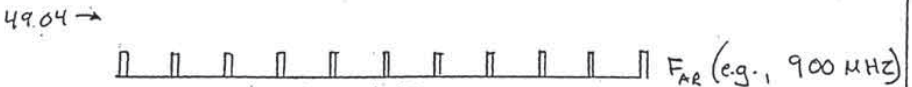


FIG. 49B



FIG. 49C

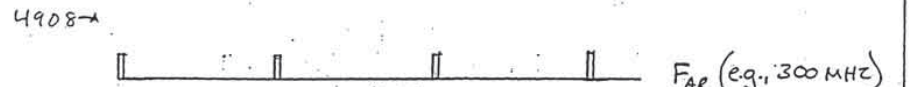


FIG. 49D



FIG. 49E



FIG. 49F

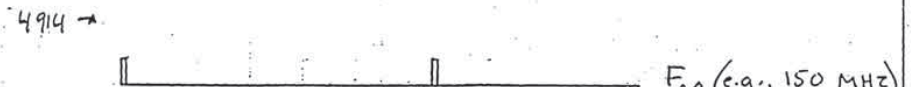


FIG. 49G



FIG. 49H

PRINT OF DRAWINGS
AS ORIGINALLY FIL

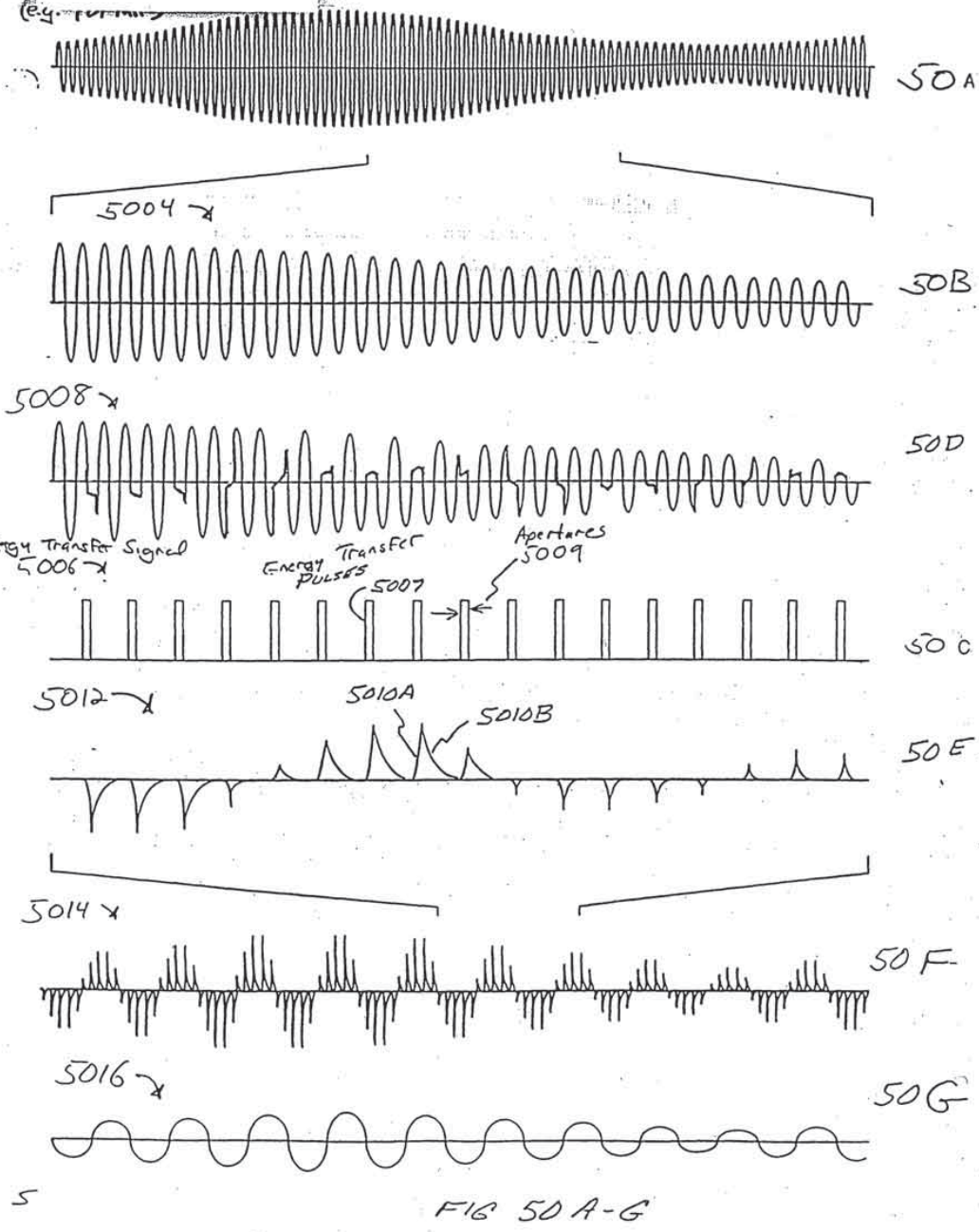


FIG 50A-G

PRINT OF DRAWINGS
AS ORIGINALLY FIL

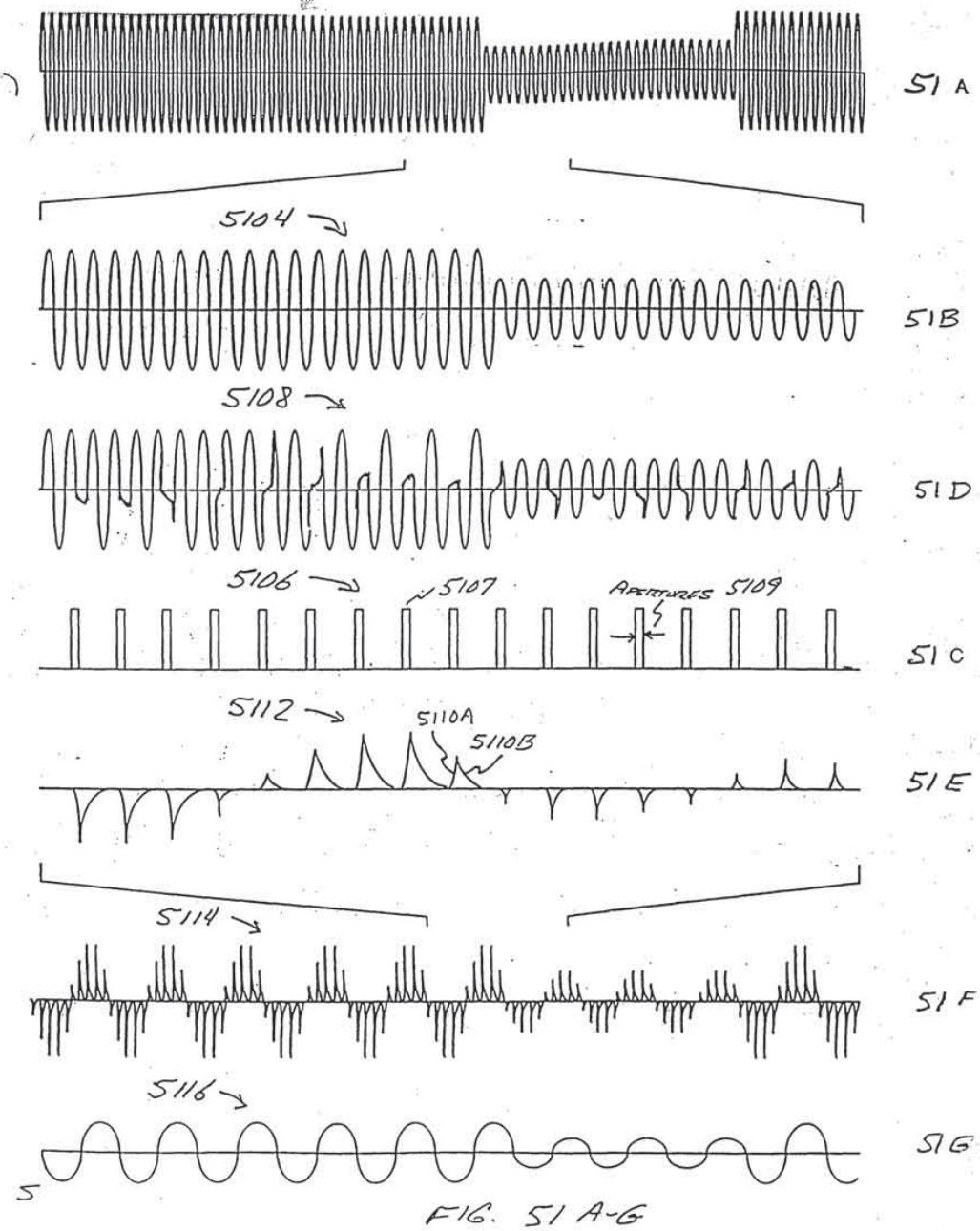


FIG. 51 A-G

PRINT OF DRAWINGS
AS ORIGINALLY FD

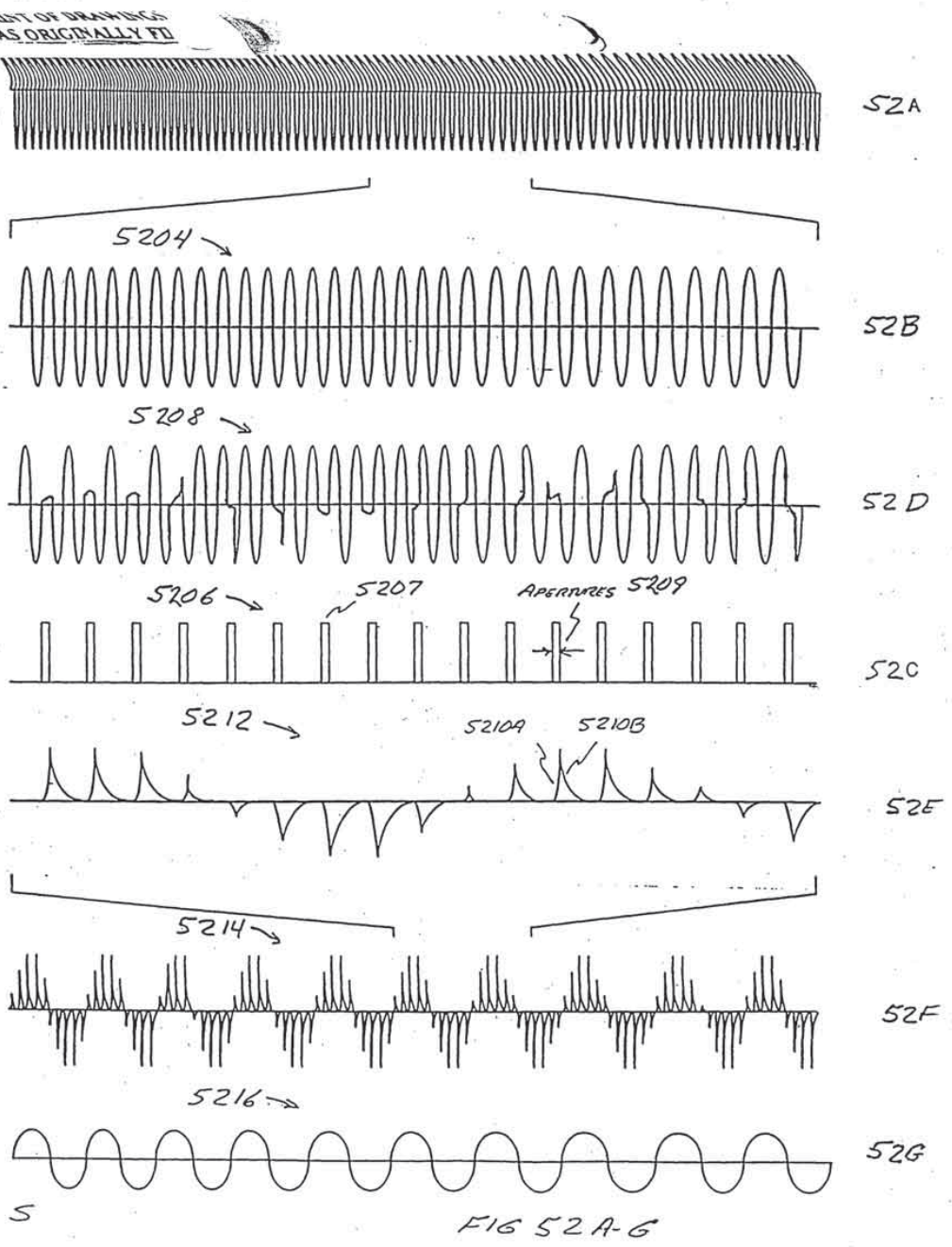
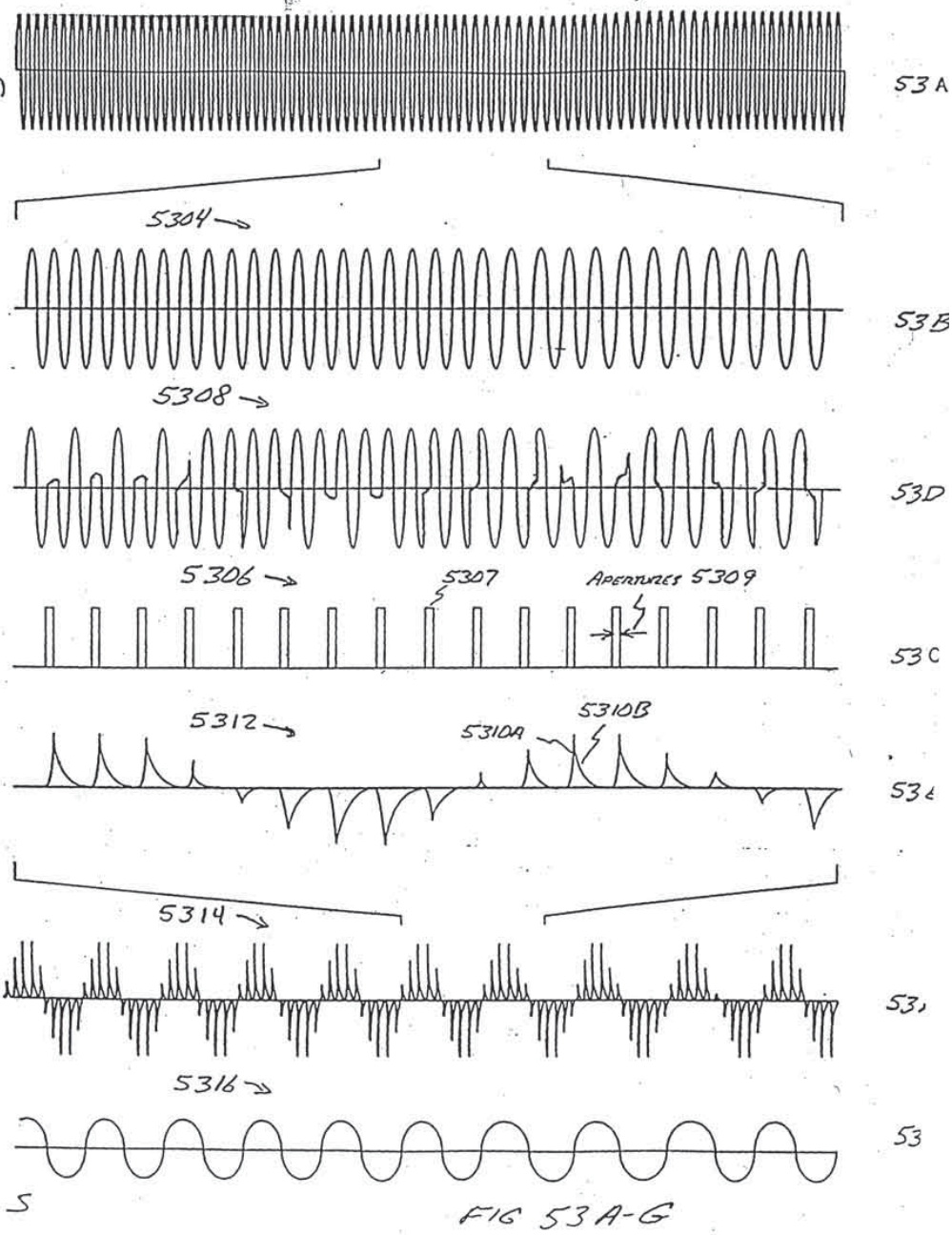


FIG 52A-G

PRINT OF DRAWINGS
AS ORIGINALLY FIL



UNDUED DUPLICATION

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AS ORIGINALLY FIL

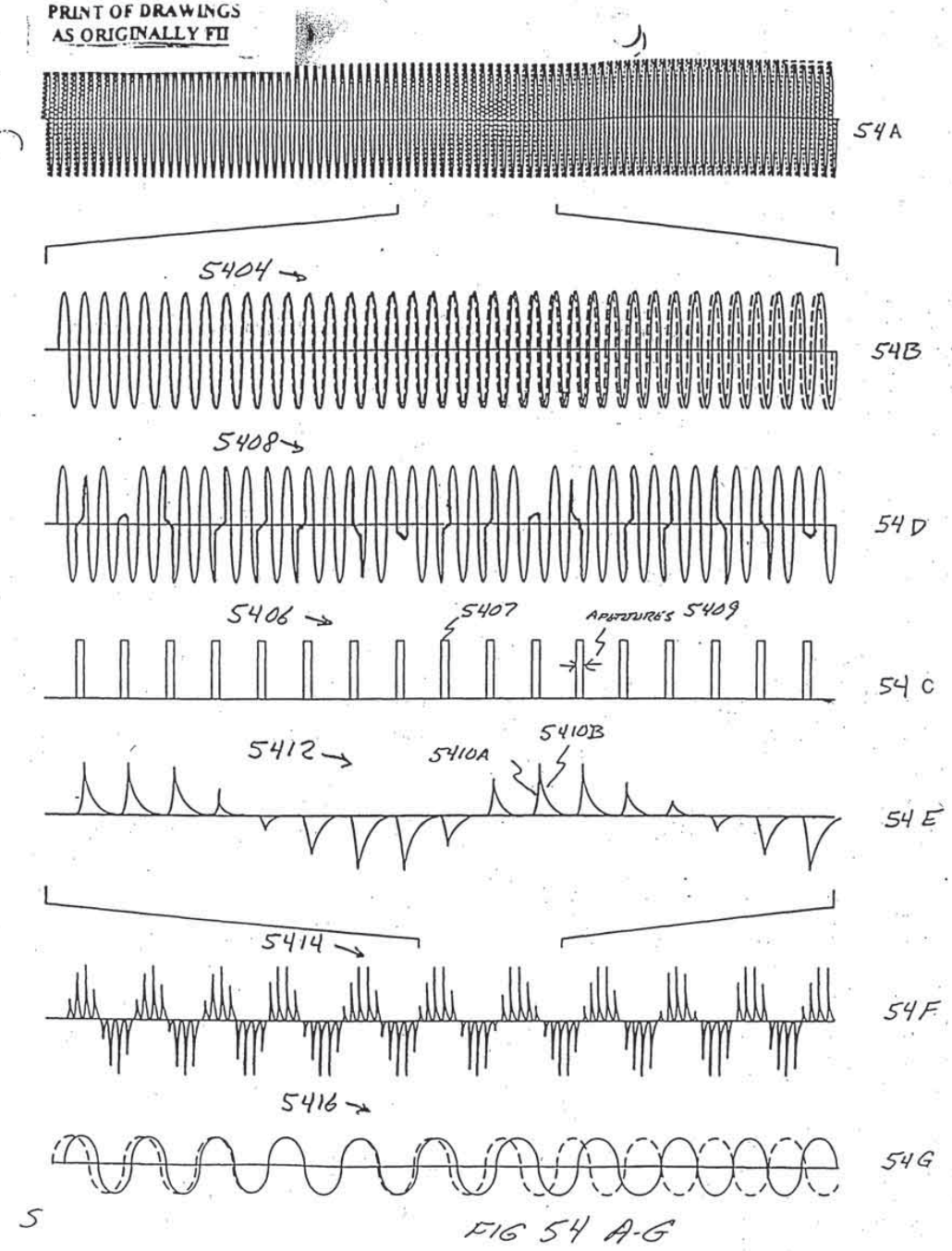


FIG 54 A-G

PRINT OF DRAWINGS
AS ORIGINALLY FILED

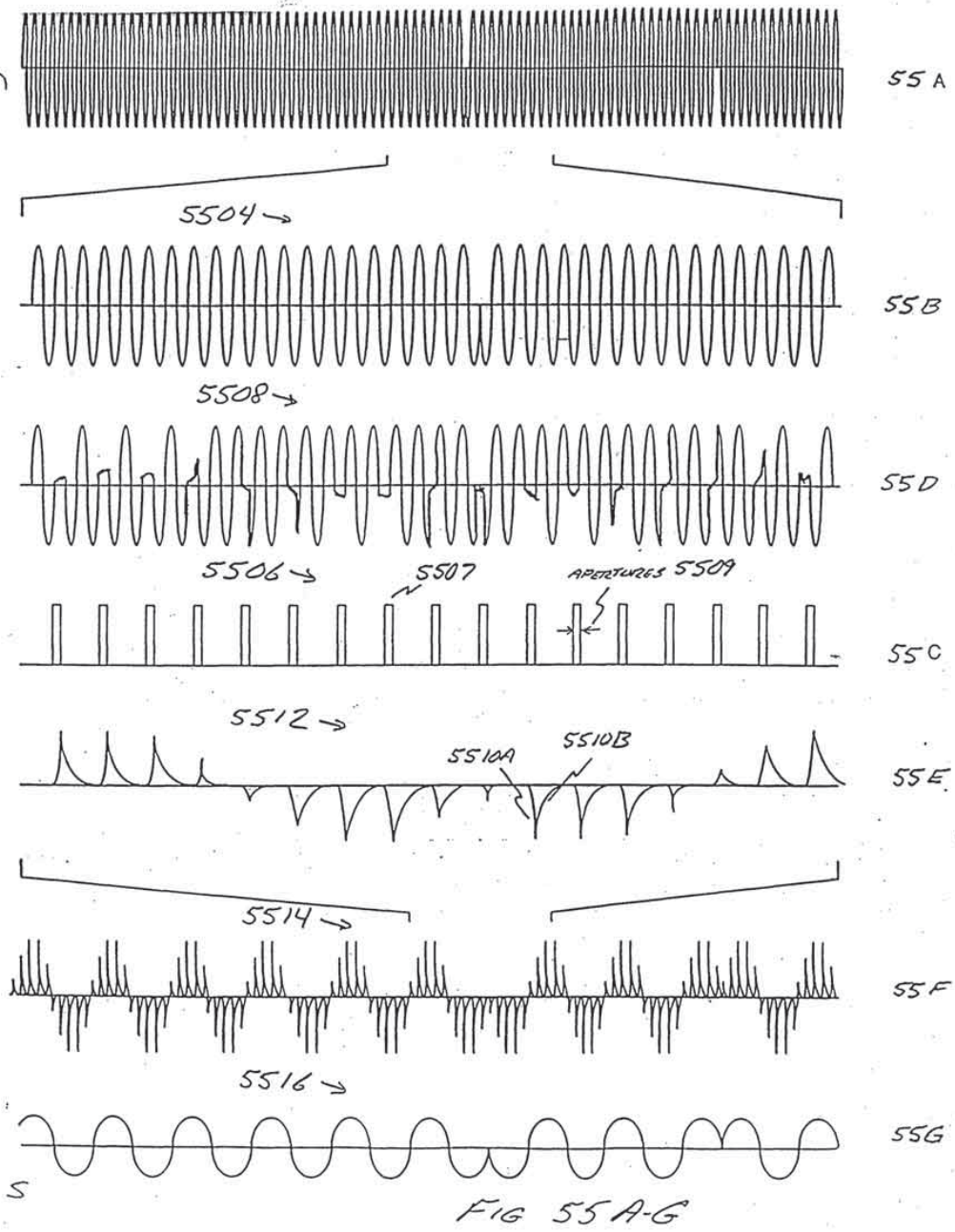


FIG 55A-G

PRINT OF DRAWINGS
AS ORIGINALLY FII

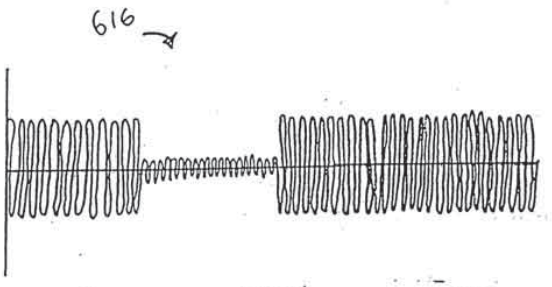


FIG. 56 A



FIG. 56 B

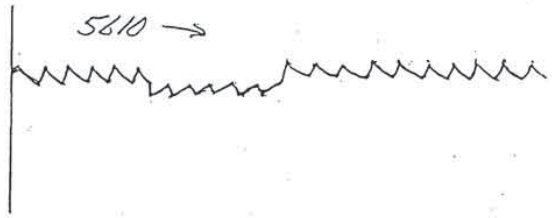


FIG. 56 C

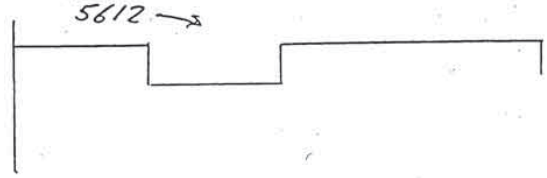
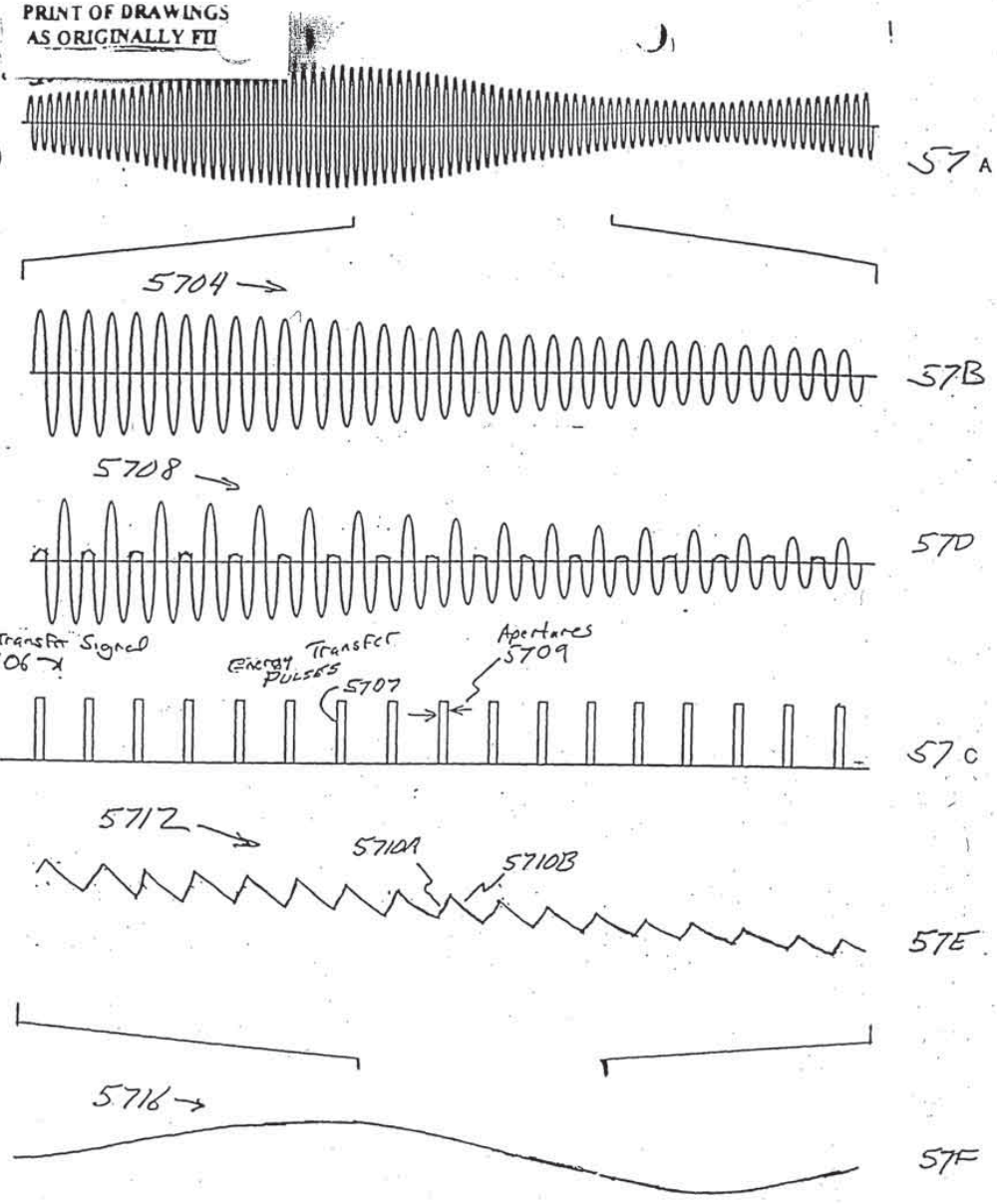


FIG. 56 D

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AS ORIGINALLY FIL



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FIG 57 A-F

PRINT OF DRAWINGS
AS ORIGINALLY FILED

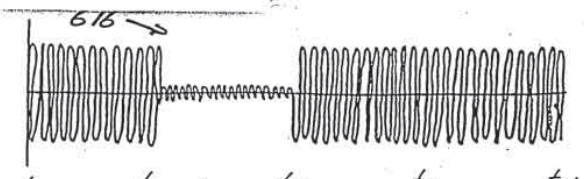


FIG. 58A

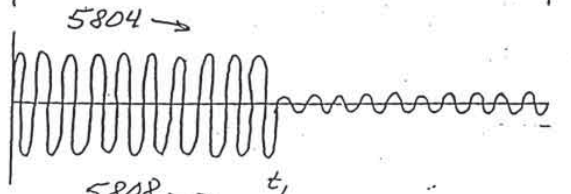


FIG. 58B

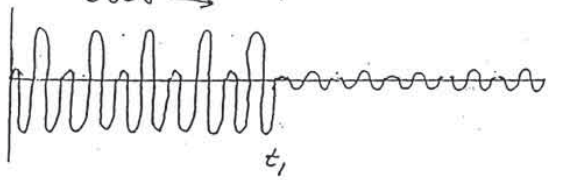


FIG. 58D

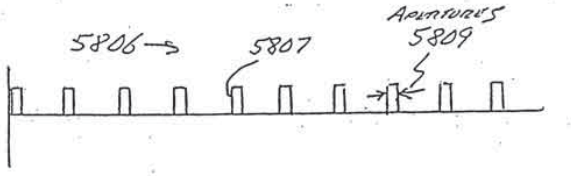


FIG. 58C

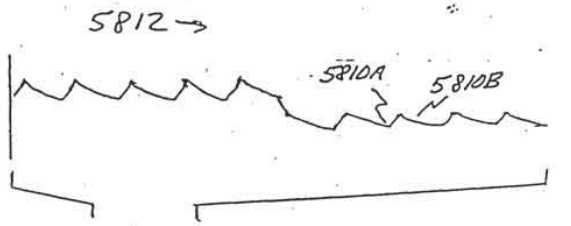


FIG. 58E

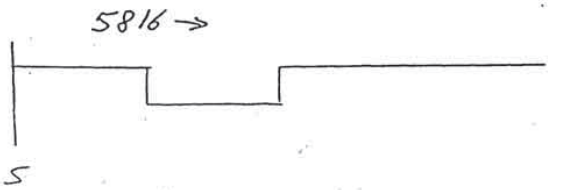


FIG. 58F

UNDER 37 CFR 1.84(a)

PRINT OF DRAWINGS
AS ORIGINALLY FI

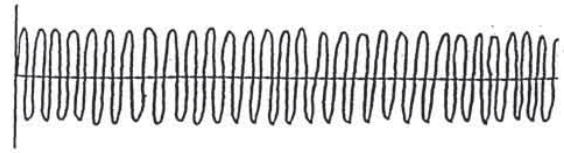


FIG. 59A

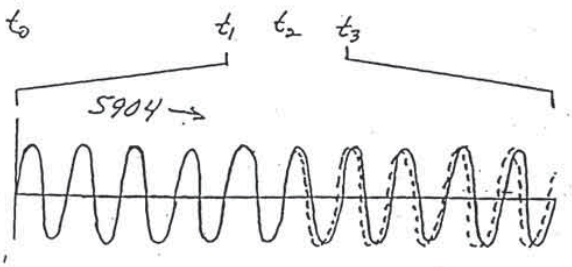


FIG. 59B

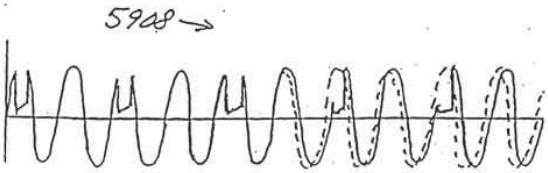


FIG. 59D

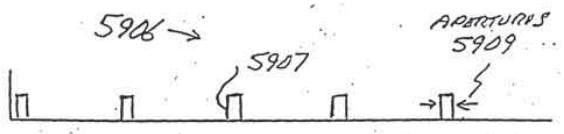


FIG. 59C

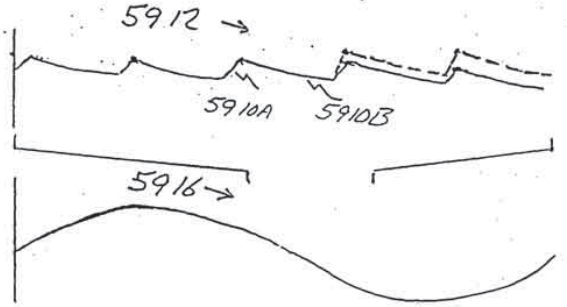


FIG. 59E

FIG. 59F

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DOCKET: 0261.0560

PRINT OF DRAWINGS
AS ORIGINALLY FIL

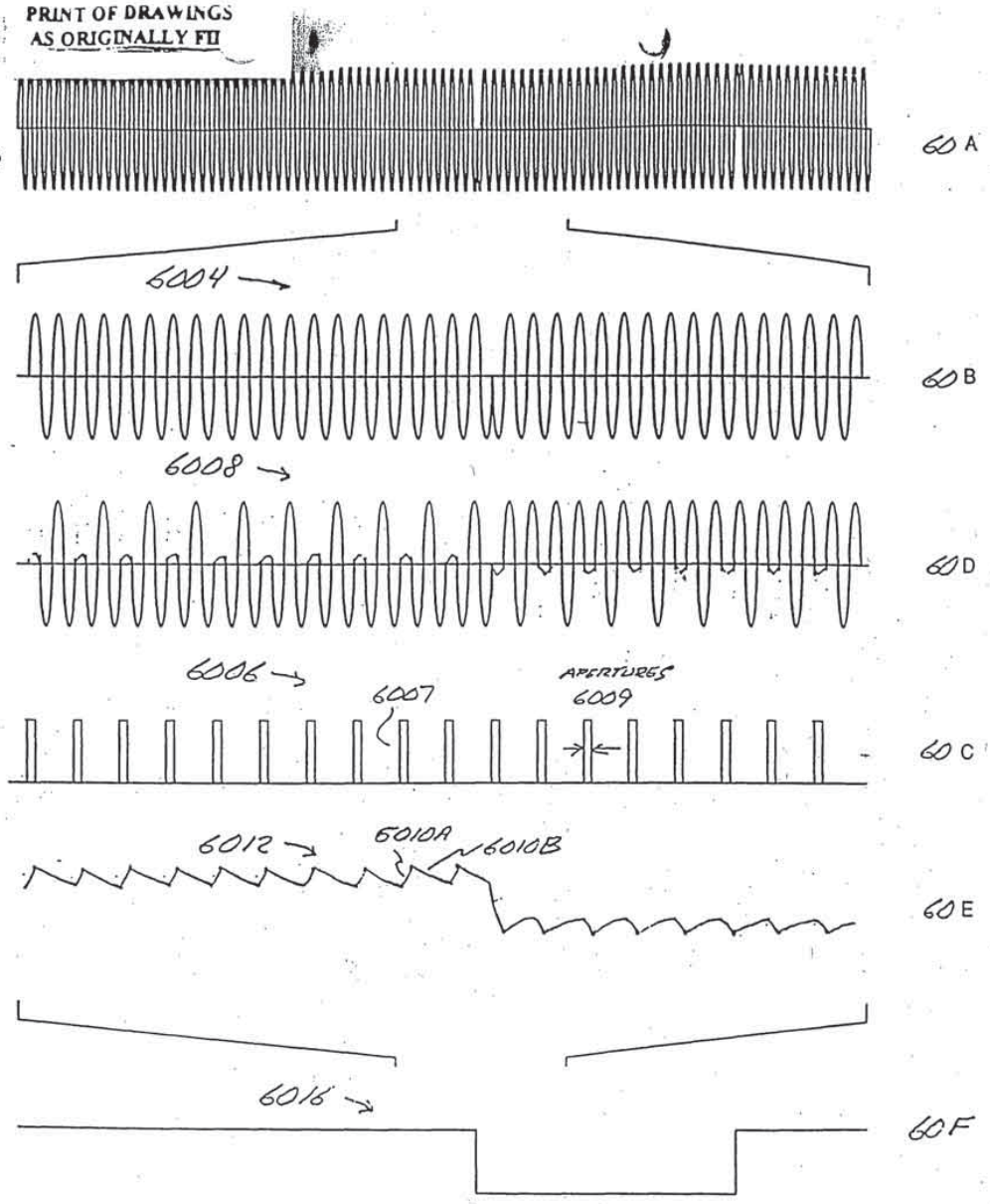


FIG 60A-F

PRINT OF DRAWINGS
AS ORIGINALLY FIL

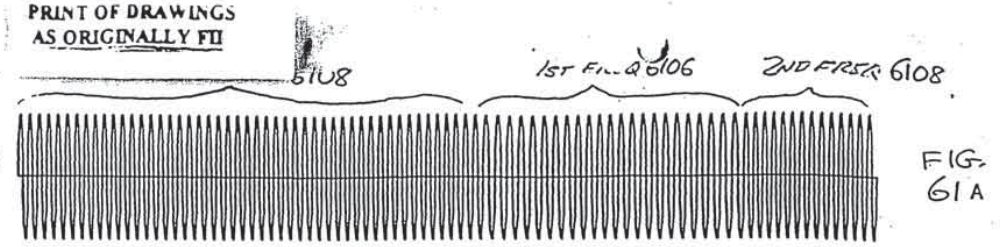


FIG. 61A

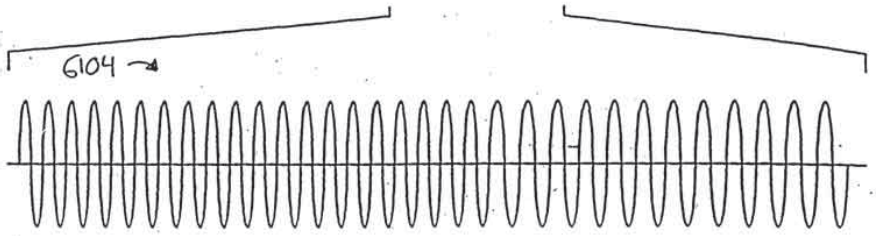


FIG. 61B

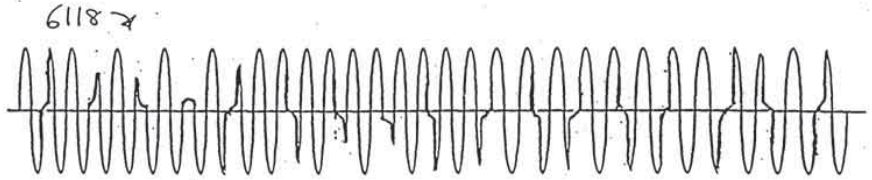


FIG. 61D

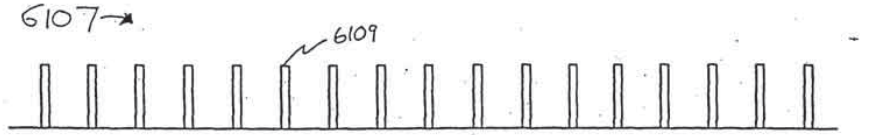


FIG. 61C



FIG. 61E

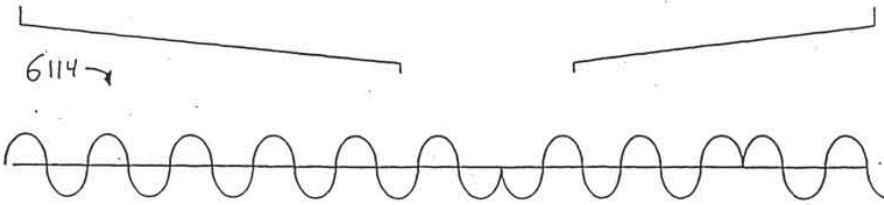


FIG. 61F

S

DOCKET 67215560

PRINT OF DRAWINGS
AS ORIGINALLY FILED

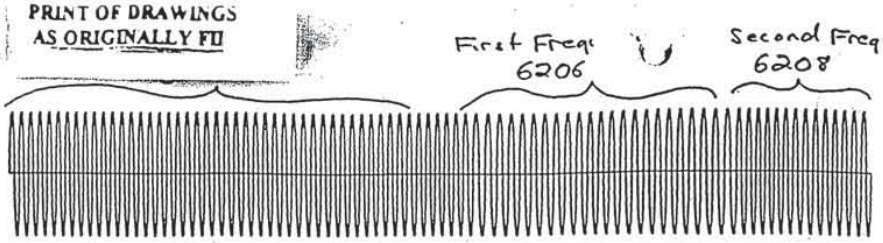


FIG. 62A



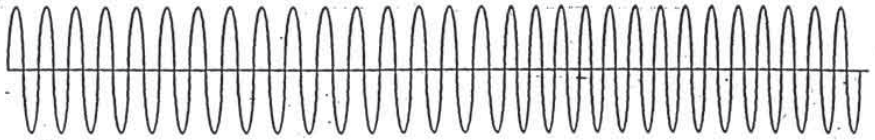


FIG. 62B

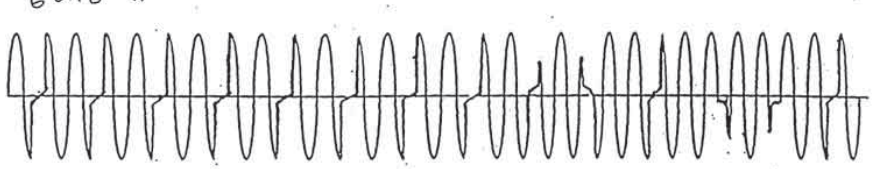


FIG. 62D

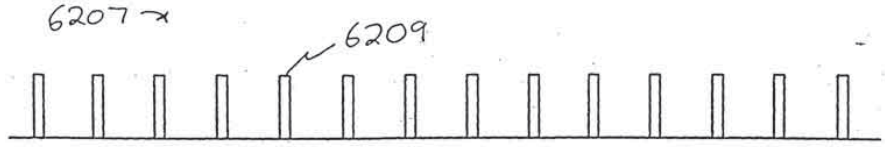


FIG. 62C

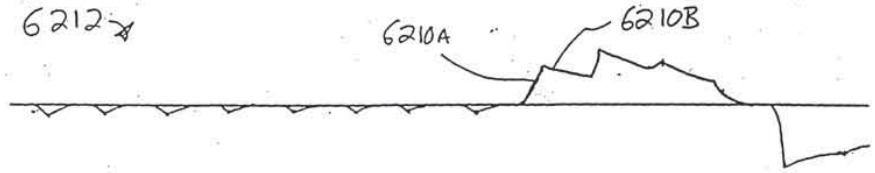


FIG. 62E

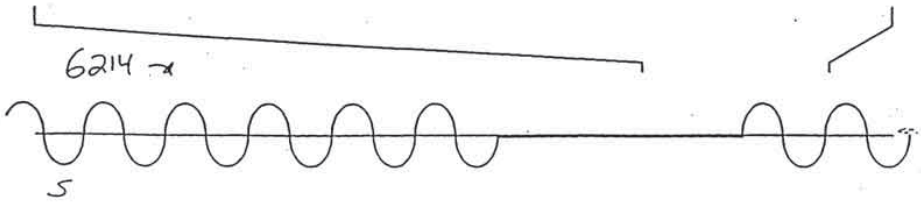


FIG 62F

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 63

PRINT OF DRAWINGS
AS ORIGINALLY FILED

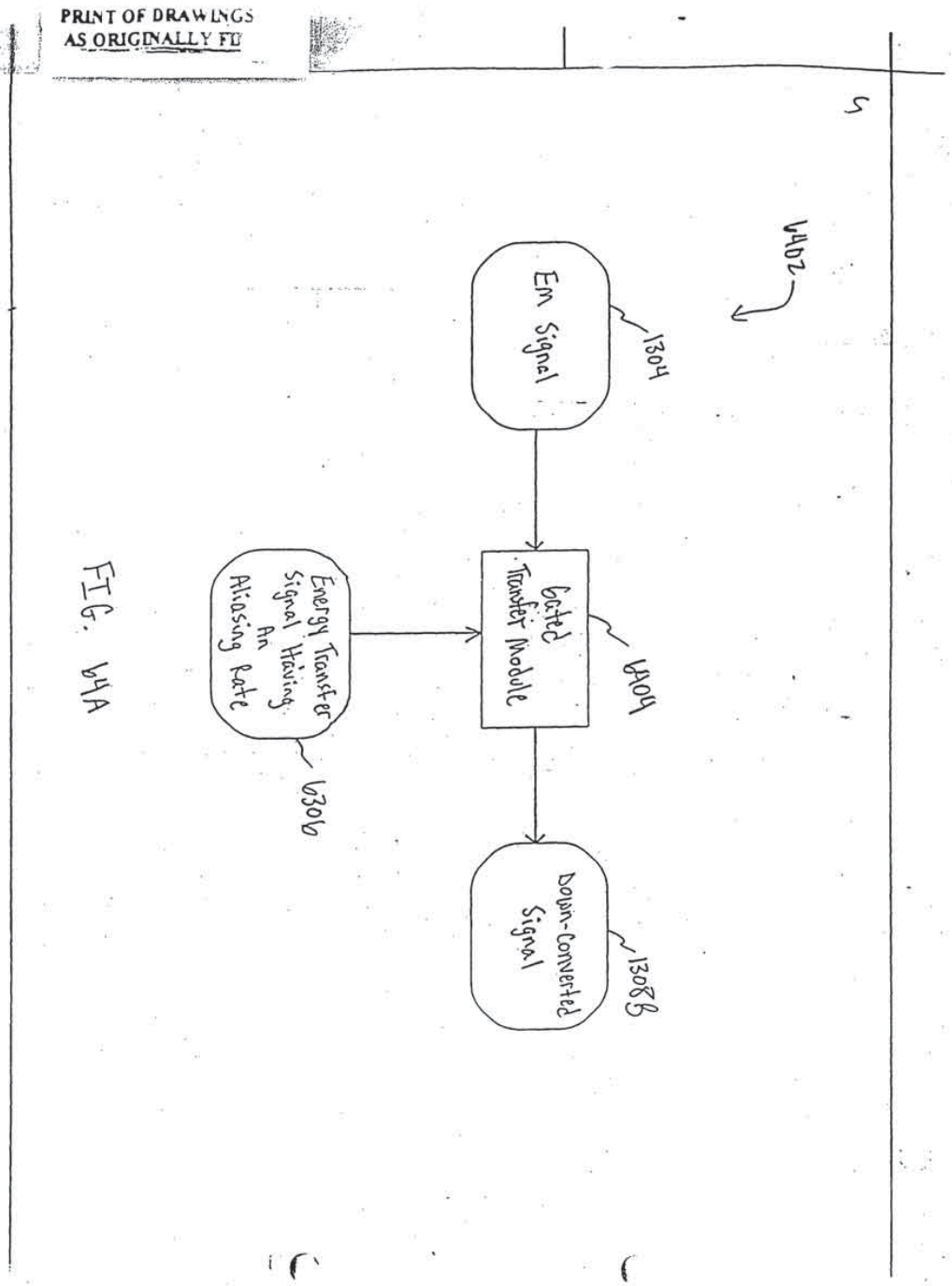


FIG. 64A

PRINT OF DRAWINGS
AS ORIGINALLY FII

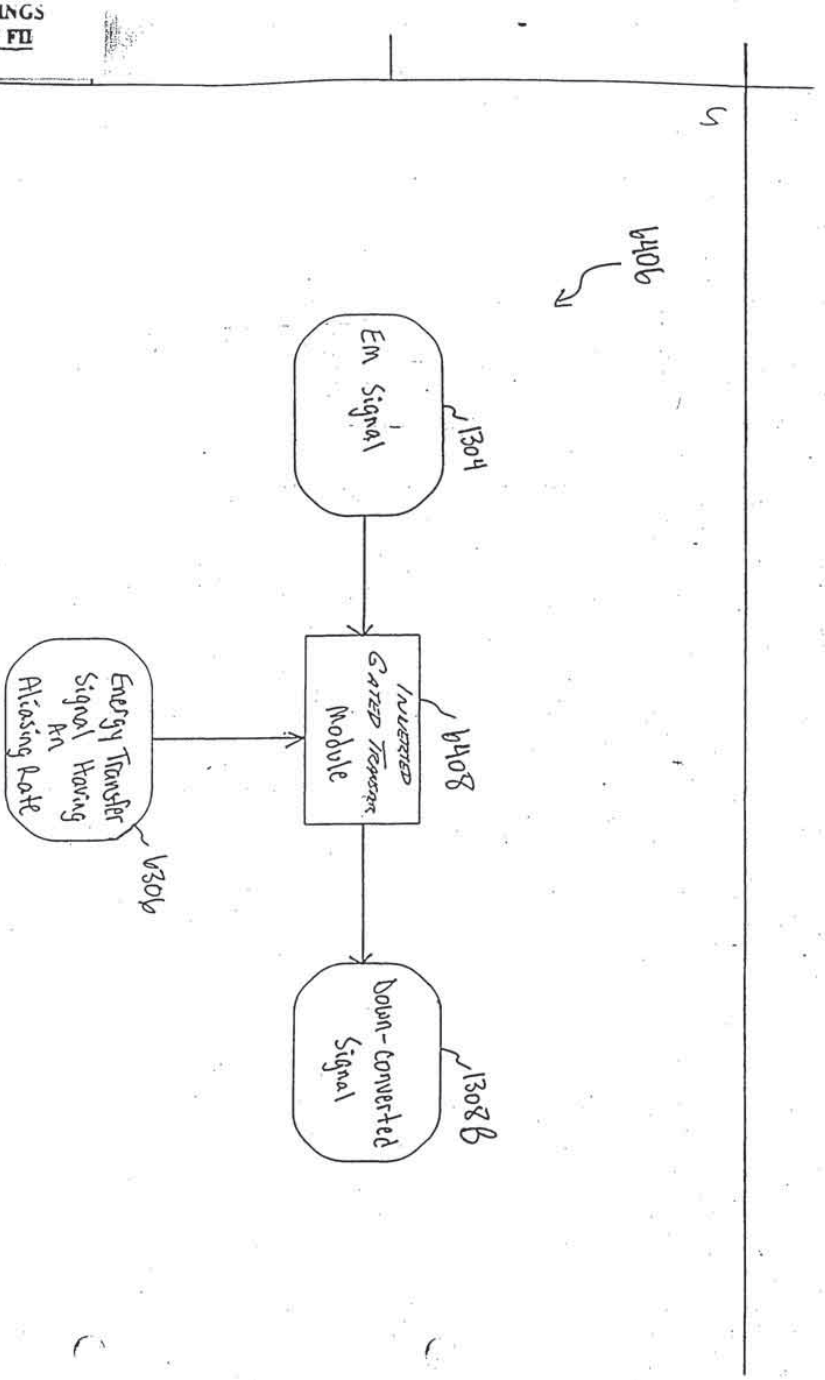


FIG. 64B

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 65

PRINT OF DRAWINGS
AS ORIGINALLY FILED

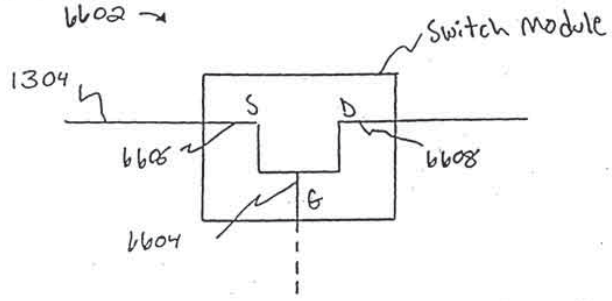


FIG. 66A

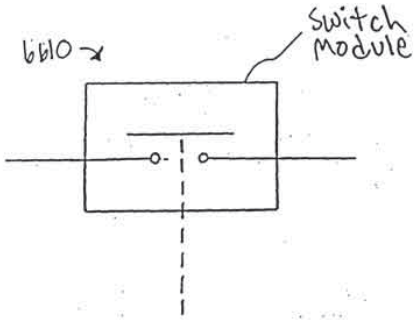


FIG. 66B

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PRINT OF DRAWINGS
AS ORIGINALLY FILED

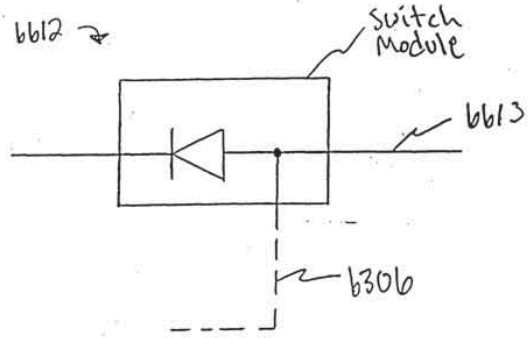


FIG. 66C

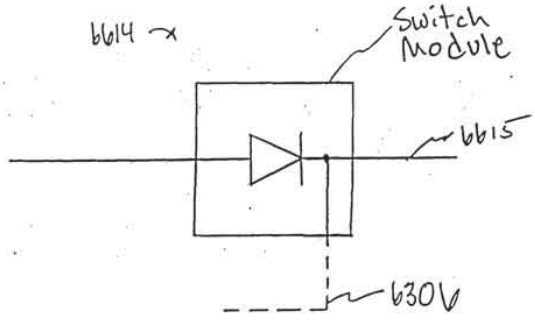


FIG. 66D

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PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 17A

PRINT OF DRAWINGS
AS ORIGINALLY FD
"Broken" or "Open"
"Made" or "Closed"
Isolation Signal 1712
t_0
t_2
FIG. 17C
Energy Transfer Signal Having An Aliasing Rate 1301
"Broken" or "Open"
"Made" or "Closed"
t_1
Energy-Variable Aperture
FIG. 17B

PRINT OF DRAWINGS
AS ORIGINALLY FII

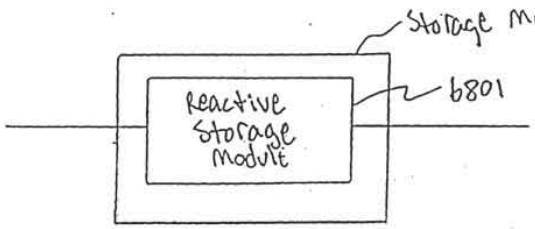


FIG. 68A

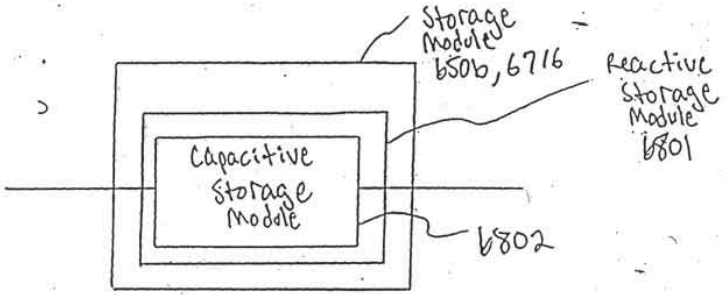


FIG. 68B

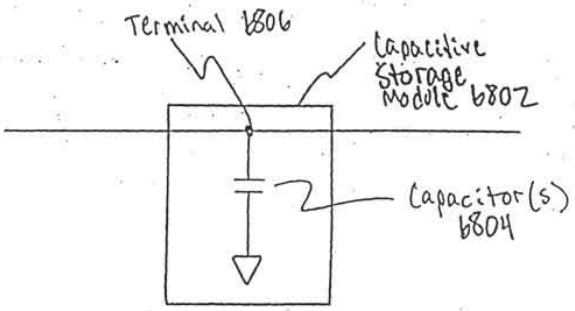


FIG. 68C

PRINT OF DRAWINGS
AS ORIGINALLY FII

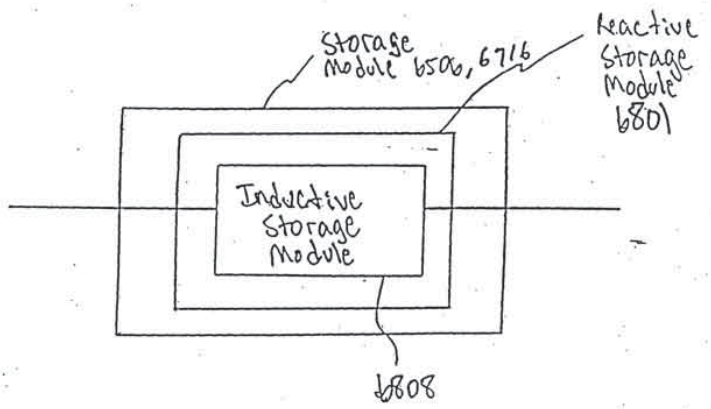


FIG. 68D

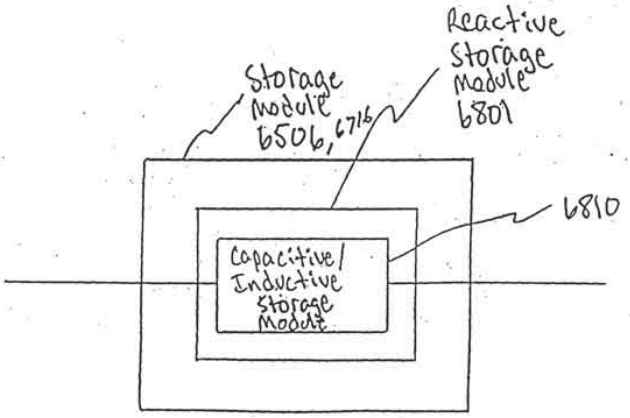


FIG. 68E

PRINT OF DRAWINGS
AS ORIGINALLY FII

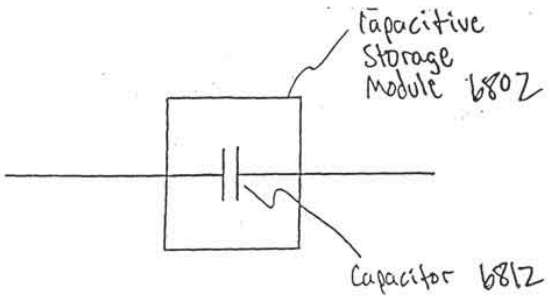


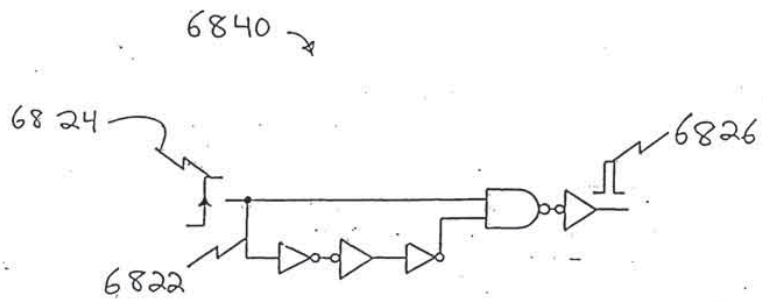
FIG. 68F

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 68G

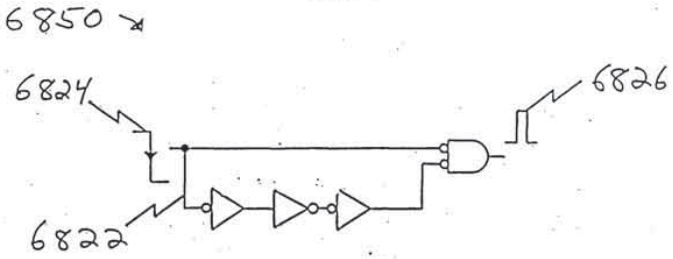
6818

PRINT OF DRAWINGS
AS ORIGINALLY FIL



A. rising edge pulse generator

FIG. 68H



B. falling-edge pulse generator

FIG. 68I

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

-substantial equivalence in logic only is necessary.
-u7 shown for polarity consistency with
ckt examples described elsewhere.

FIG 68 I

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG 68K

68L

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 69

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 70 - Impedance Matched Aliasing Module

0052179-020000

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG 7A

PRINT OF DRAWINGS
AS ORIGINALLY FIL

PRINT OF DRAWINGS
AS ORIGINALLY FIL

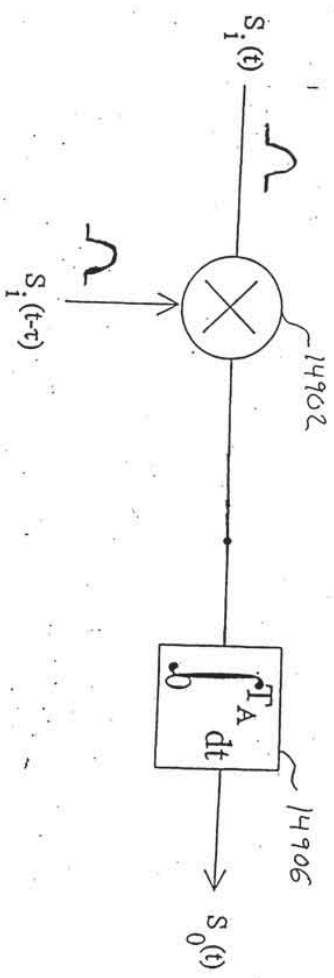


FIG. 72

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 73 - Aligning Module

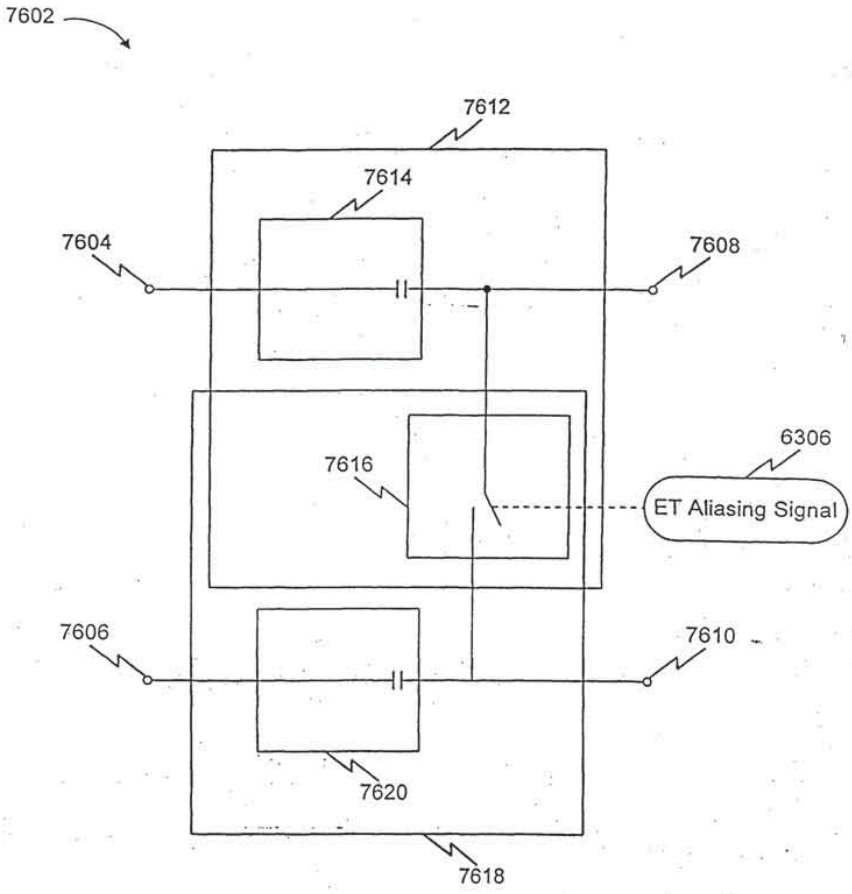
PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 74

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 7A
FIG. 7B
FIG. 7C
FIG. 7D
FIG. 7E
FIG. 7F

PRINT OF DRAWINGS
AS ORIGINALLY FIL



Differential Energy Transfer Configuration

FIG. 76A

9807-10.vsd/40

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AS ORIGINALLY FIL

Differential Input to Differential Output

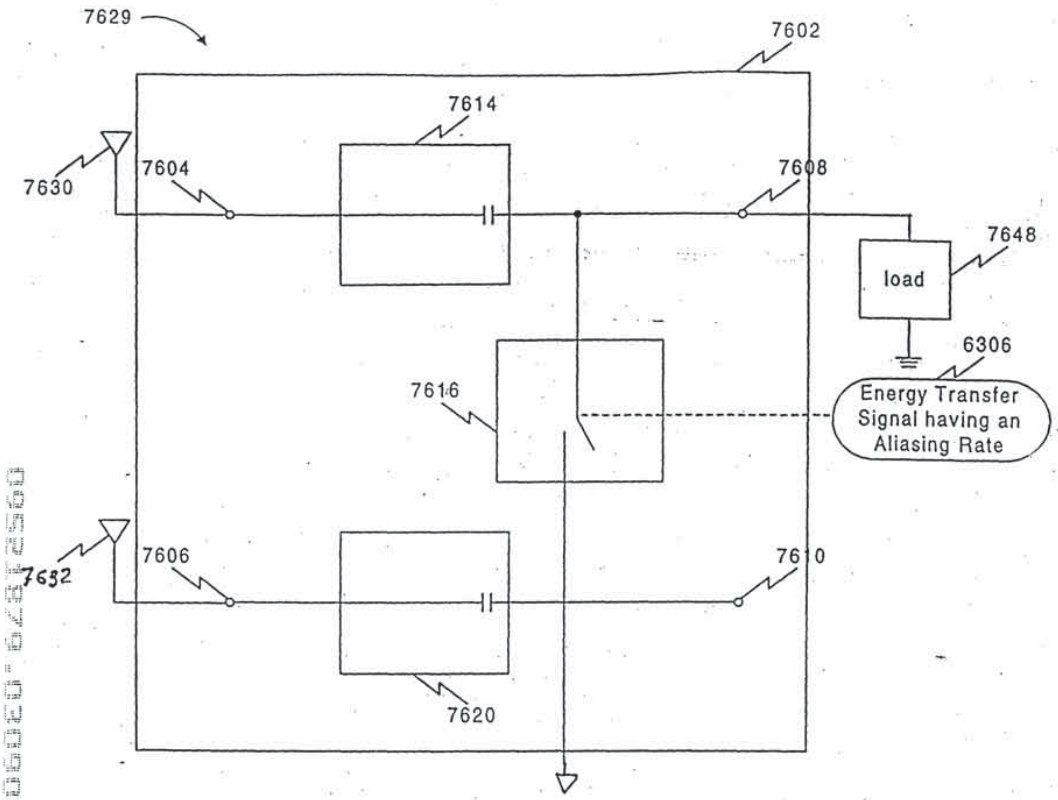
FIG. 76B

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Single Input to Differential Output

FIG. 76C

PRINT OF DRAWINGS
AS ORIGINALLY FIL



Differential Input to Single Output
FIG. 76D

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Example Input/Output Circuitry

FIG. 76E

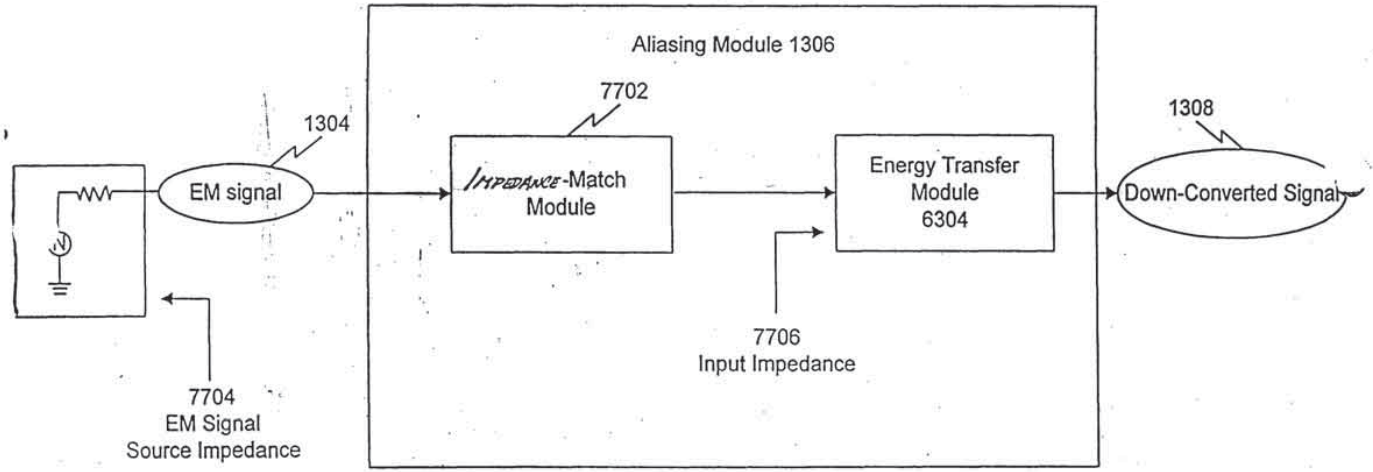


FIG. 77A

PRINT OF DRAWINGS AS ORIGINALLY FIL

09521879.030900

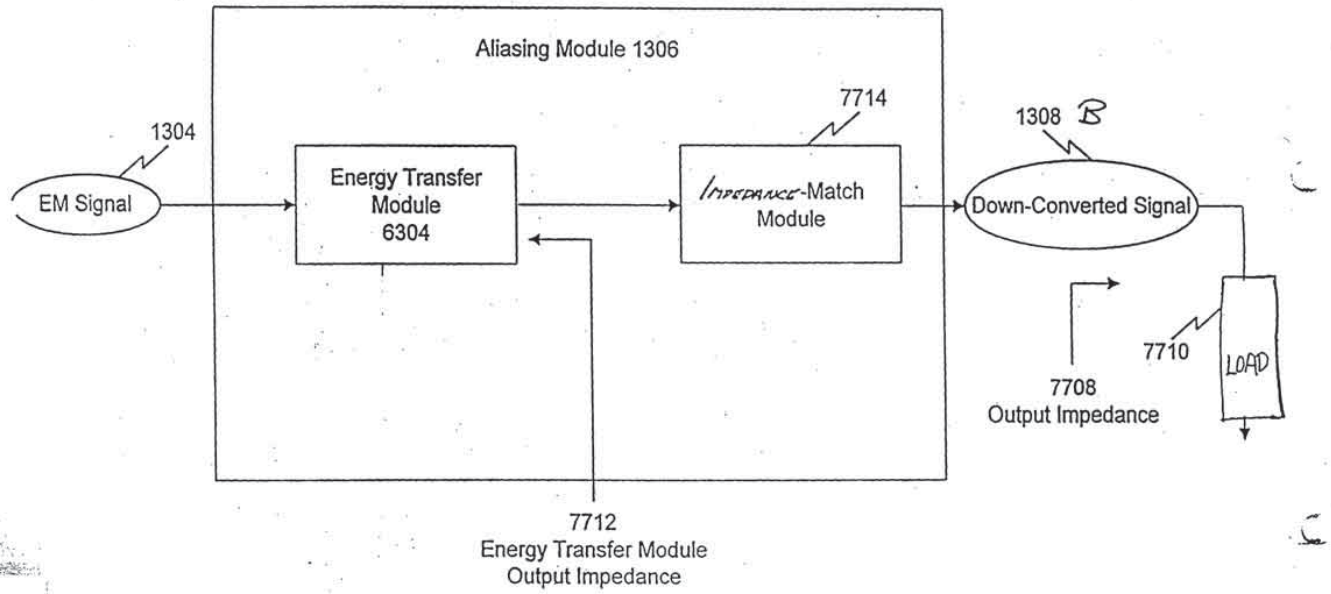


FIG. 77B

PRINT OF DRAWINGS AS ORIGINALLY FIL

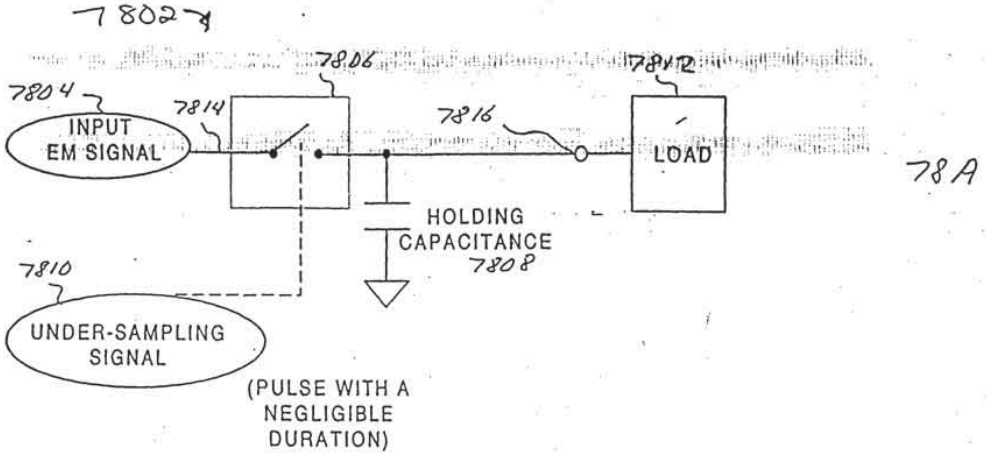
09521979.030900

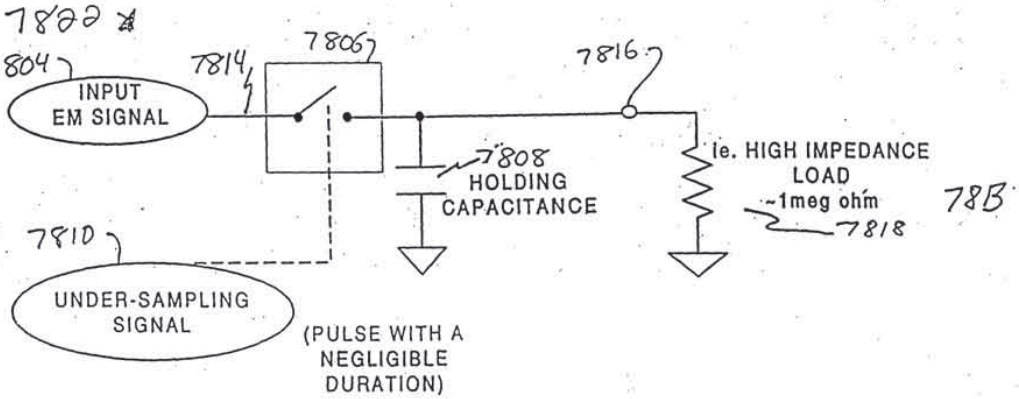
PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 77C

9807-10.ms047

PRINT OF DRAWINGS
AS ORIGINALLY FIL





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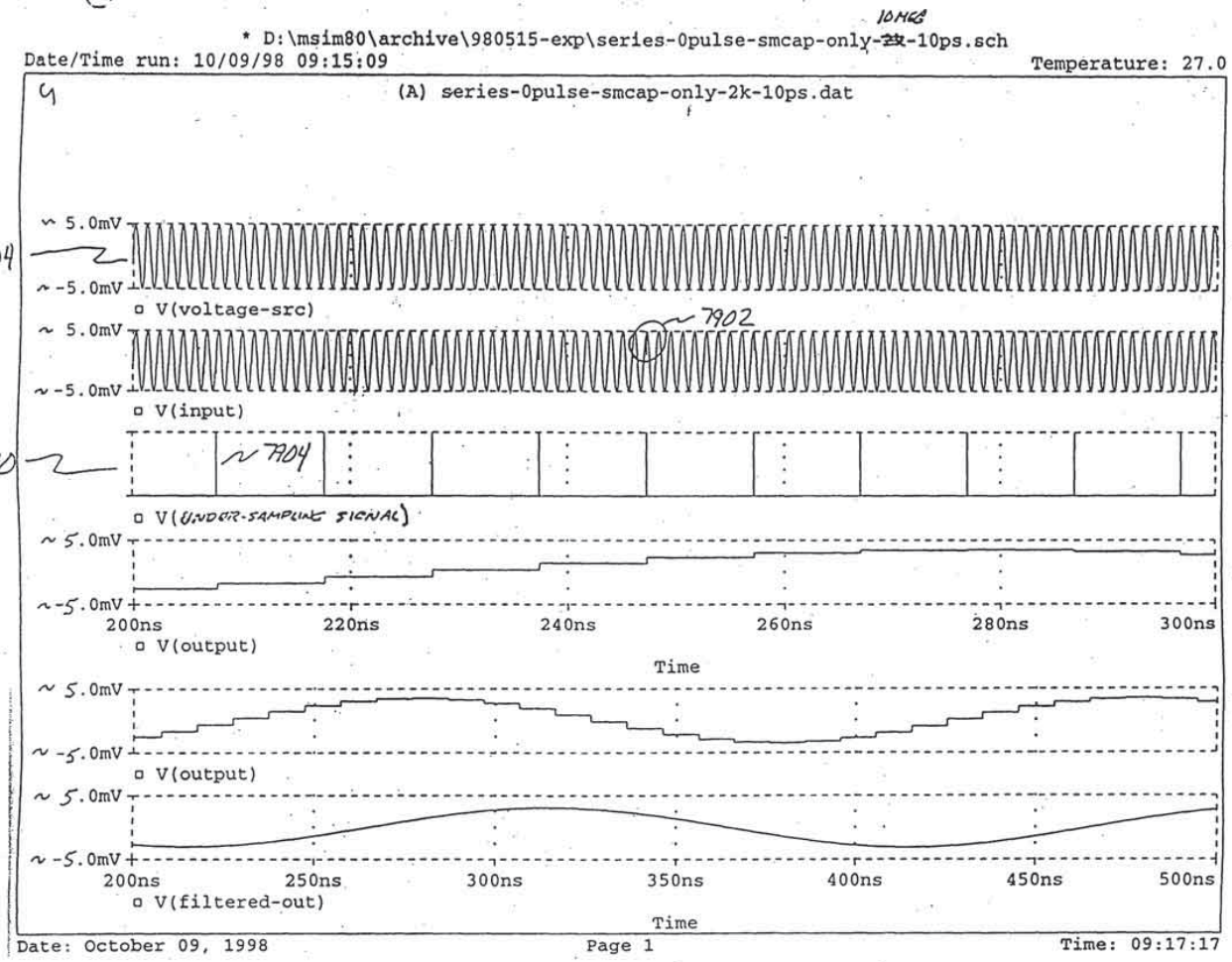


FIG 79

PRINT OF DRAWINGS AS ORIGINALLY FIL

09521879.030900

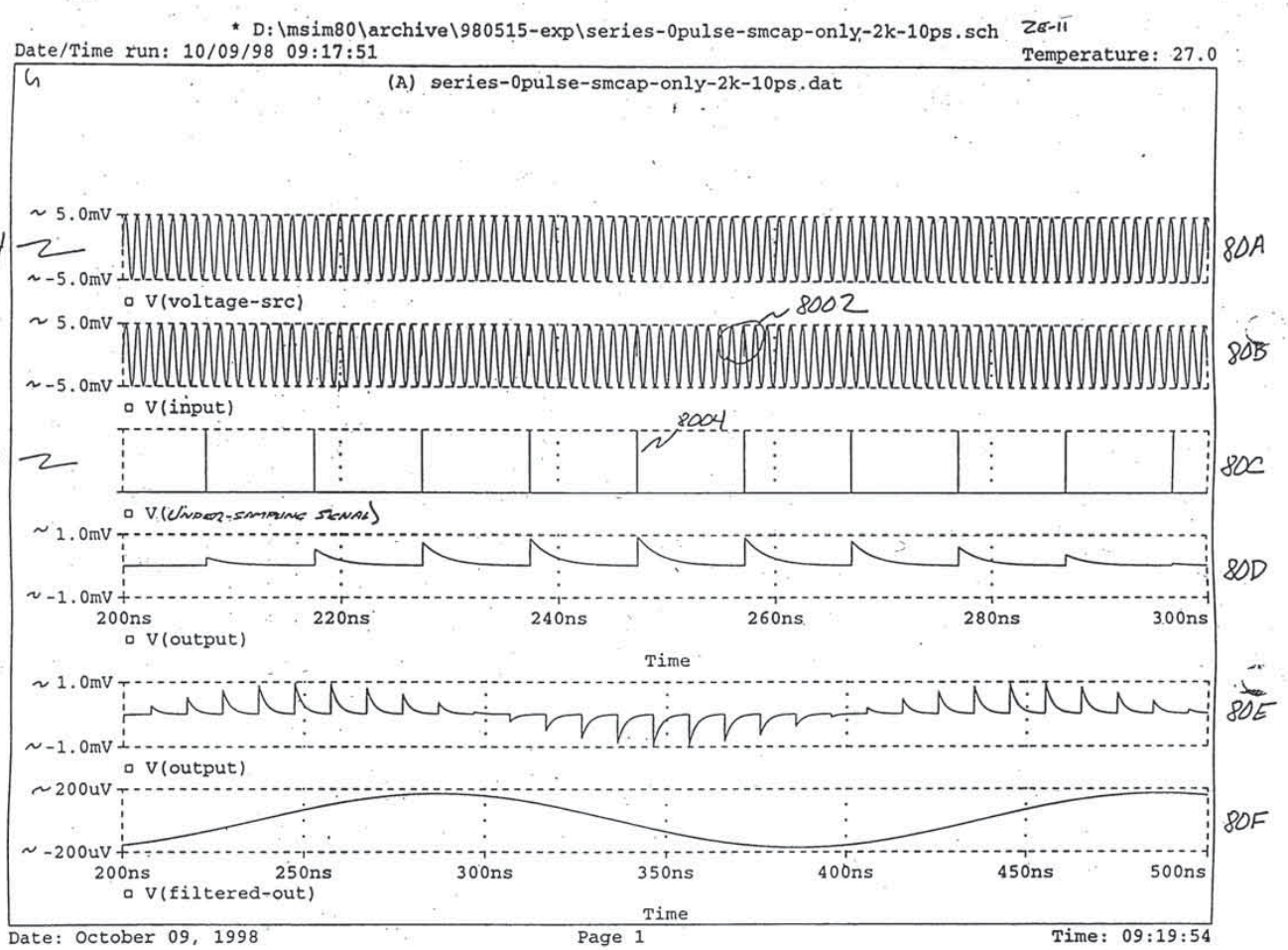


FIG 80

09521879.030900

PRINT OF DRAWINGS AS ORIGINALLY FIL

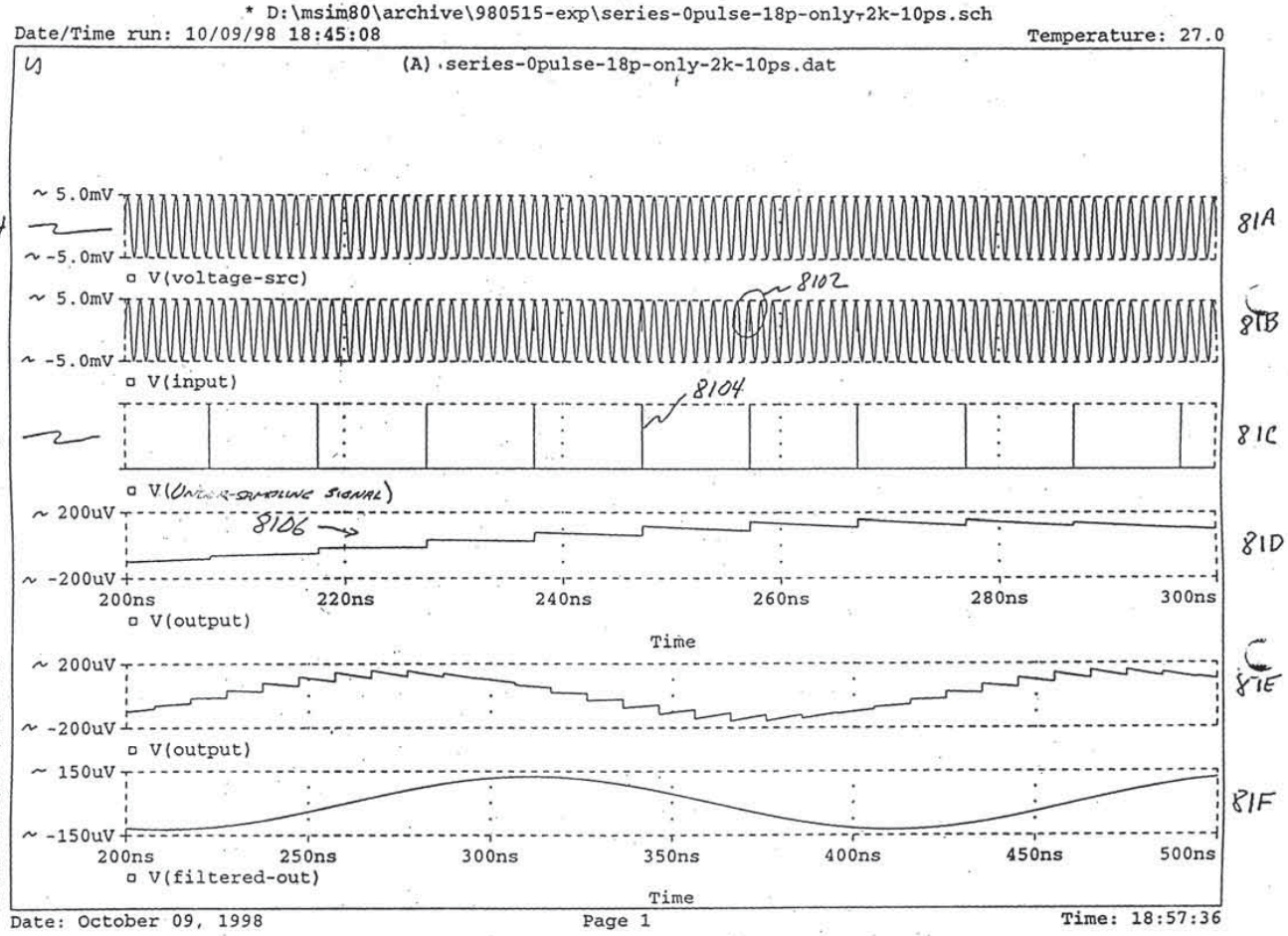


FIG 81

PRINT OF DRAWINGS AS ORIGINALLY FILED

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

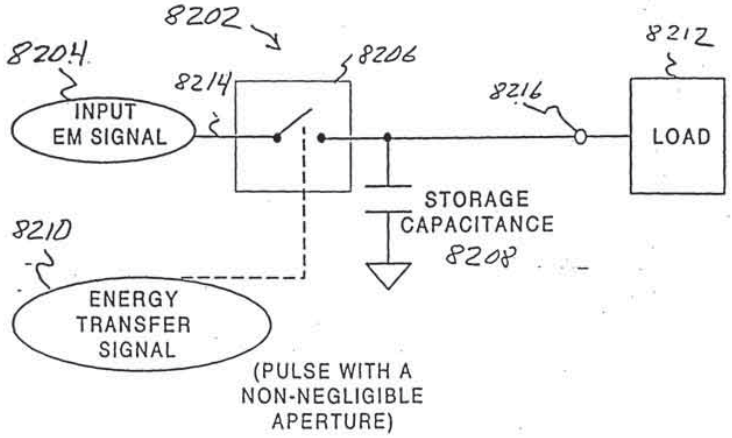


FIG. 82A

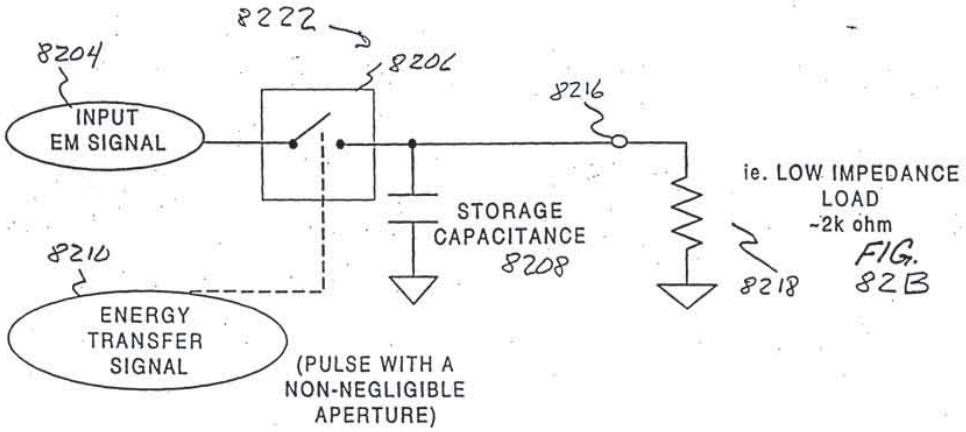


FIG. 82B

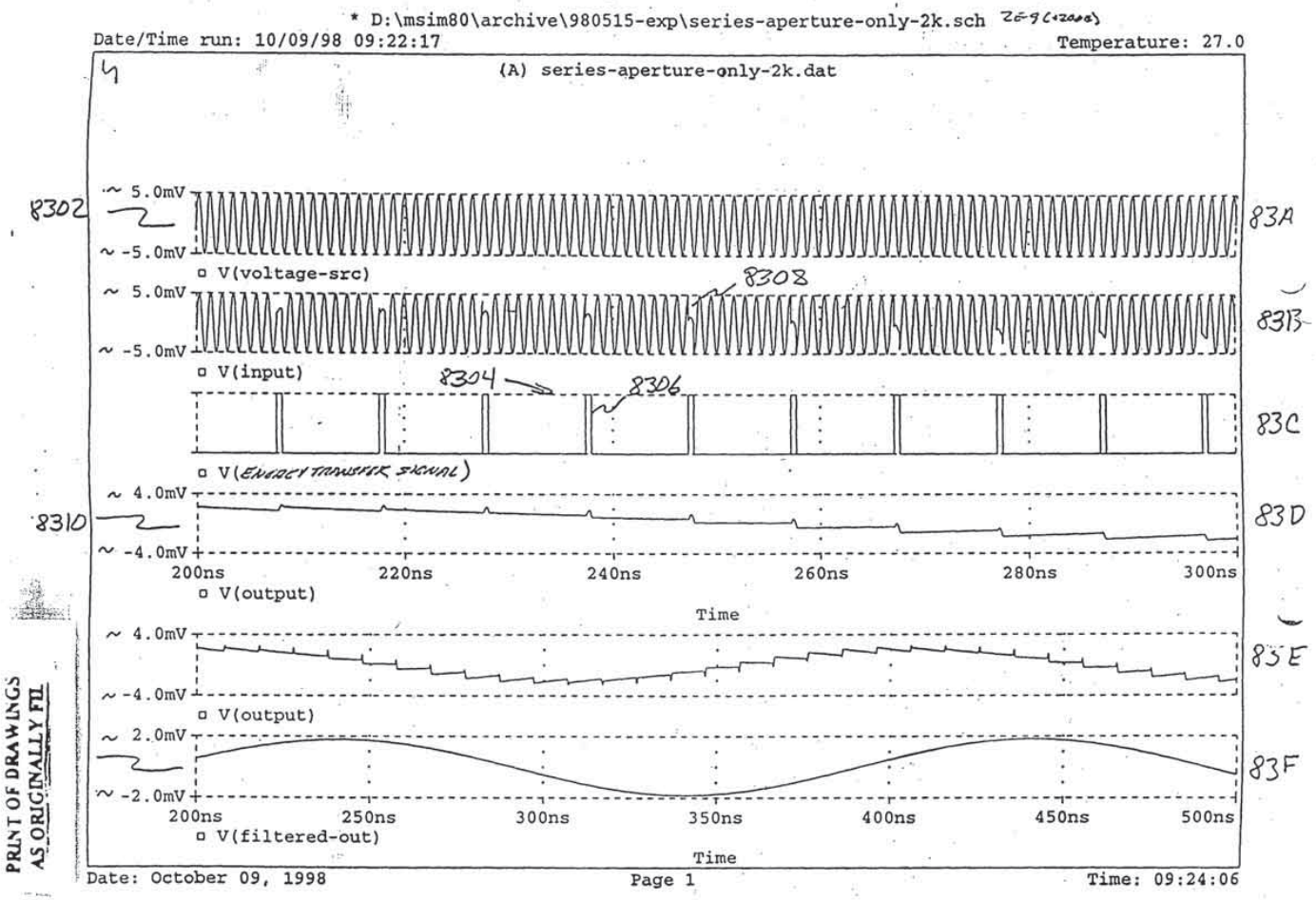


FIG 83A-F

PRINT OF DRAWINGS AS ORIGINALLY FIL

PRINT OF DRAWINGS
AS ORIGINALLY FIL

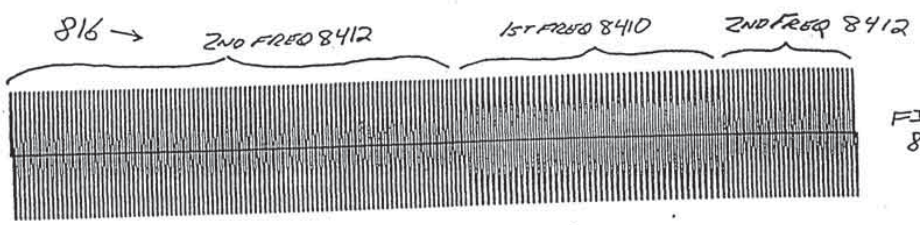


FIG. 84 A

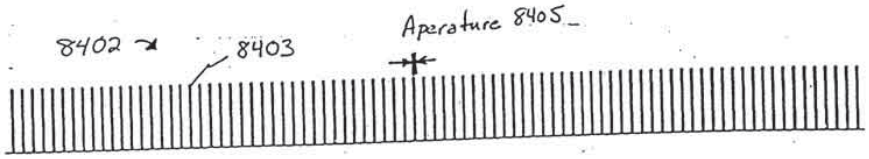


FIG 84 B

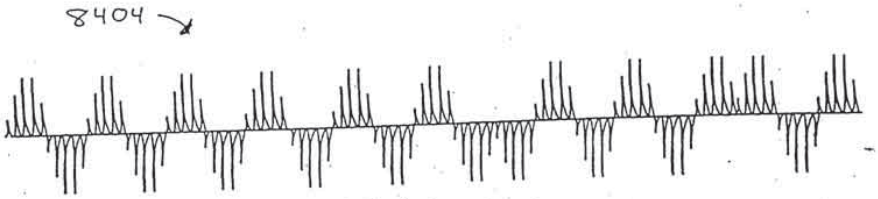


FIG. 84 C

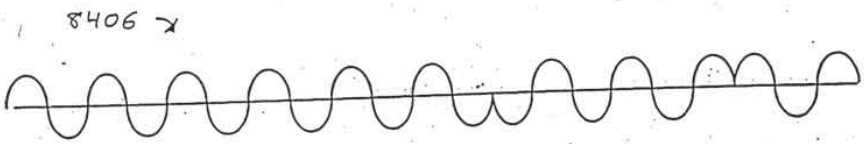


FIG. 84 D

PRINT OF DRAWINGS
AS ORIGINALLY FIL

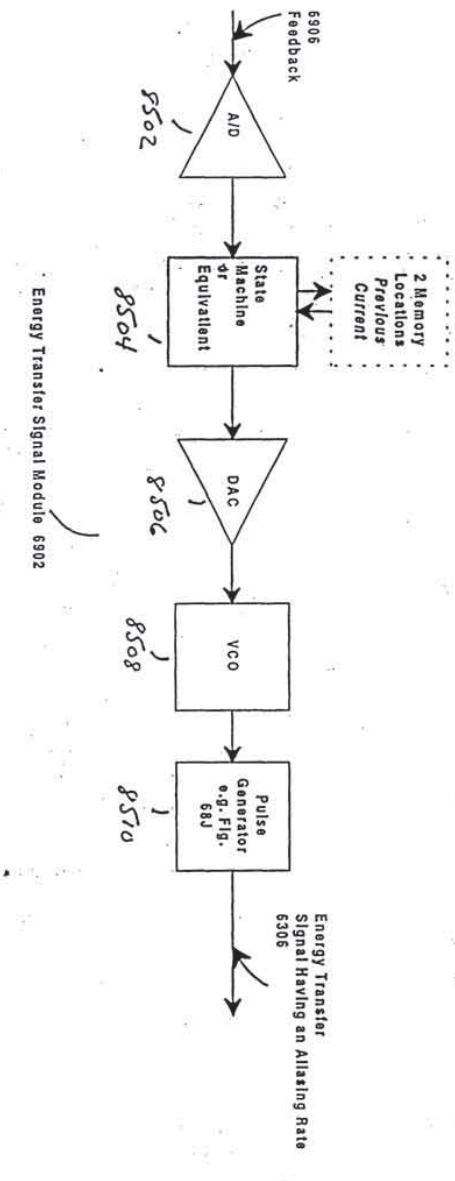
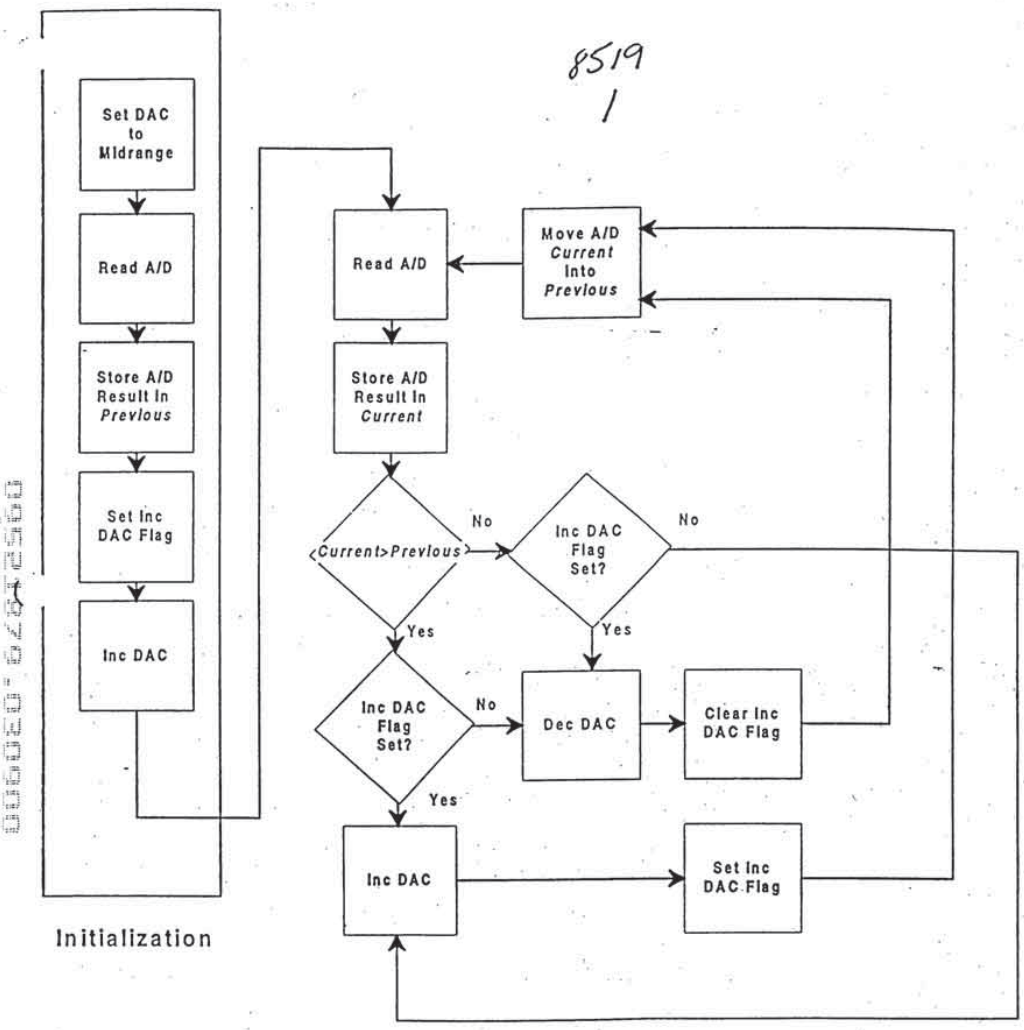


FIG. 85A

PRINT OF DRAWINGS
AS ORIGINALLY FIL

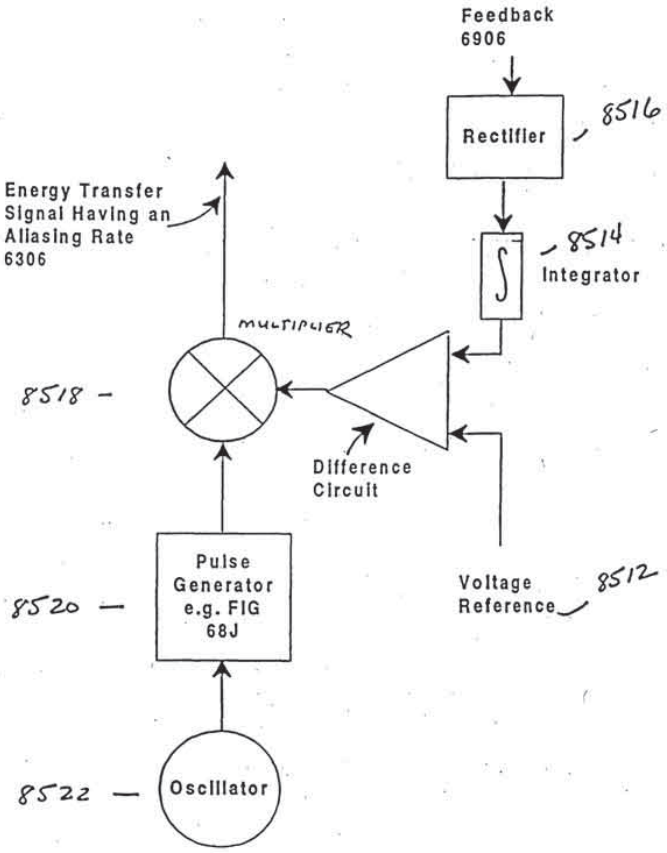
8519
1



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FIG. 85B

PRINT OF DRAWINGS
AS ORIGINALLY FIL



Energy Transfer Signal Module 6902

FIG. 85C

PRINT OF DRAWINGS
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Fig 86

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 87

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 88

PRINT OF DRAWINGS
AS ORIGINALLY FILED

Fig 89

PRINT OF DRAWINGS
AS ORIGINALLY FIL

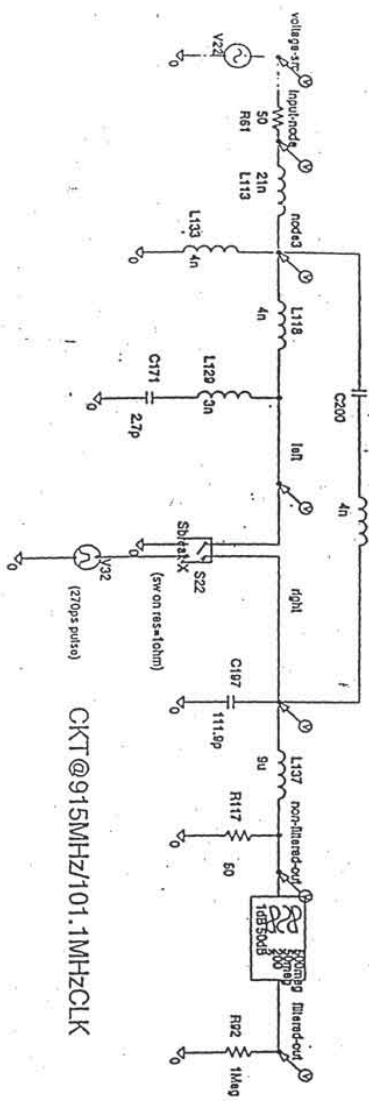


Fig 90

CKT@915MHz/101.1MHzCLK

PRINT OF DRAWINGS
AS ORIGINALLY FILED

Fig 91

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 92

PRINT OF DRAWINGS
AS ORIGINALLY FIL

Fig 93

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 94A

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG 94B

FIG 94C

PRINT OF DRAWINGS
AS ORIGINALLY FILED

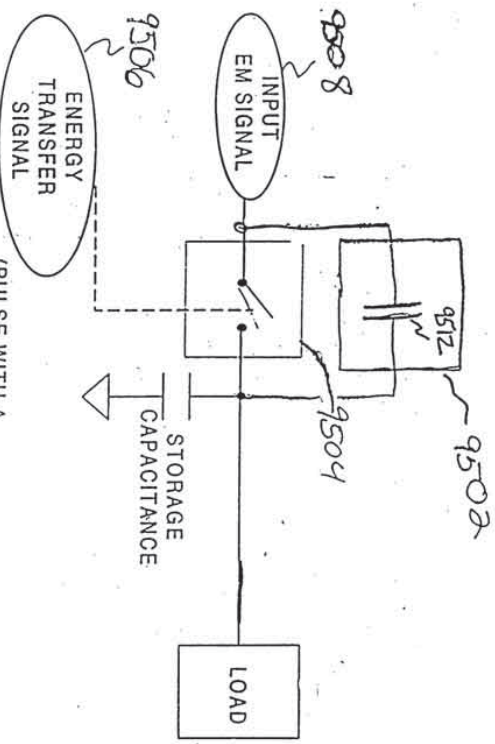


Fig 95

PRINT OF DRAWINGS
AS ORIGINALLY FIL

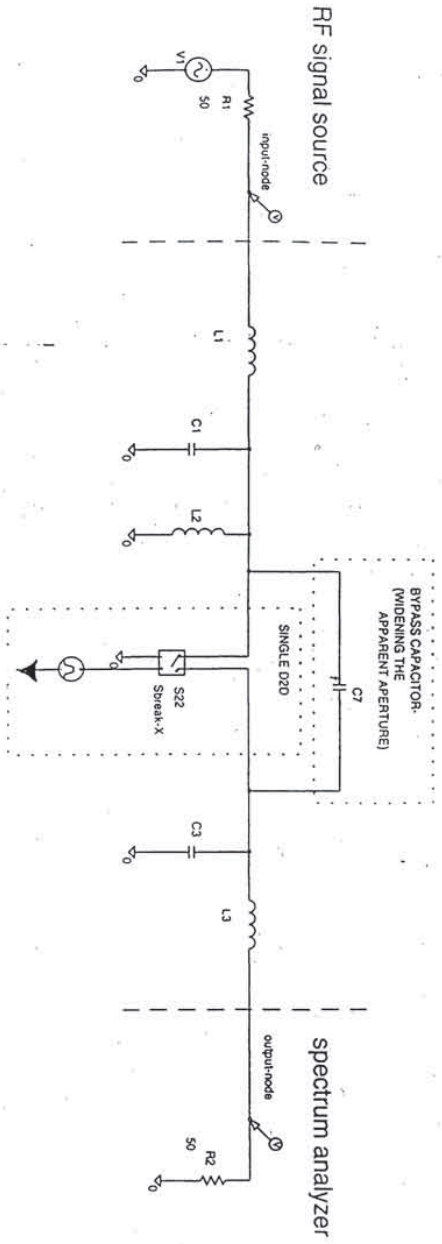


FIG. 96

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 97

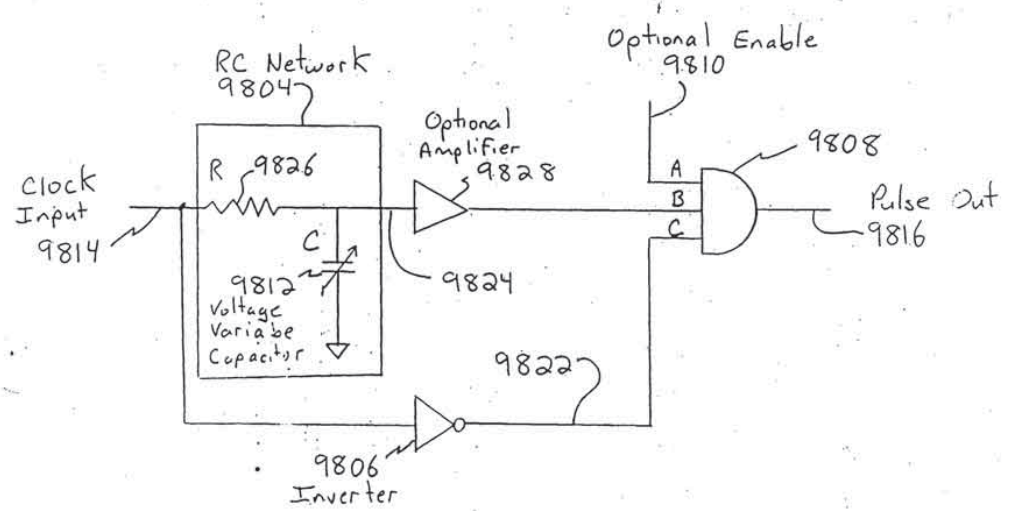
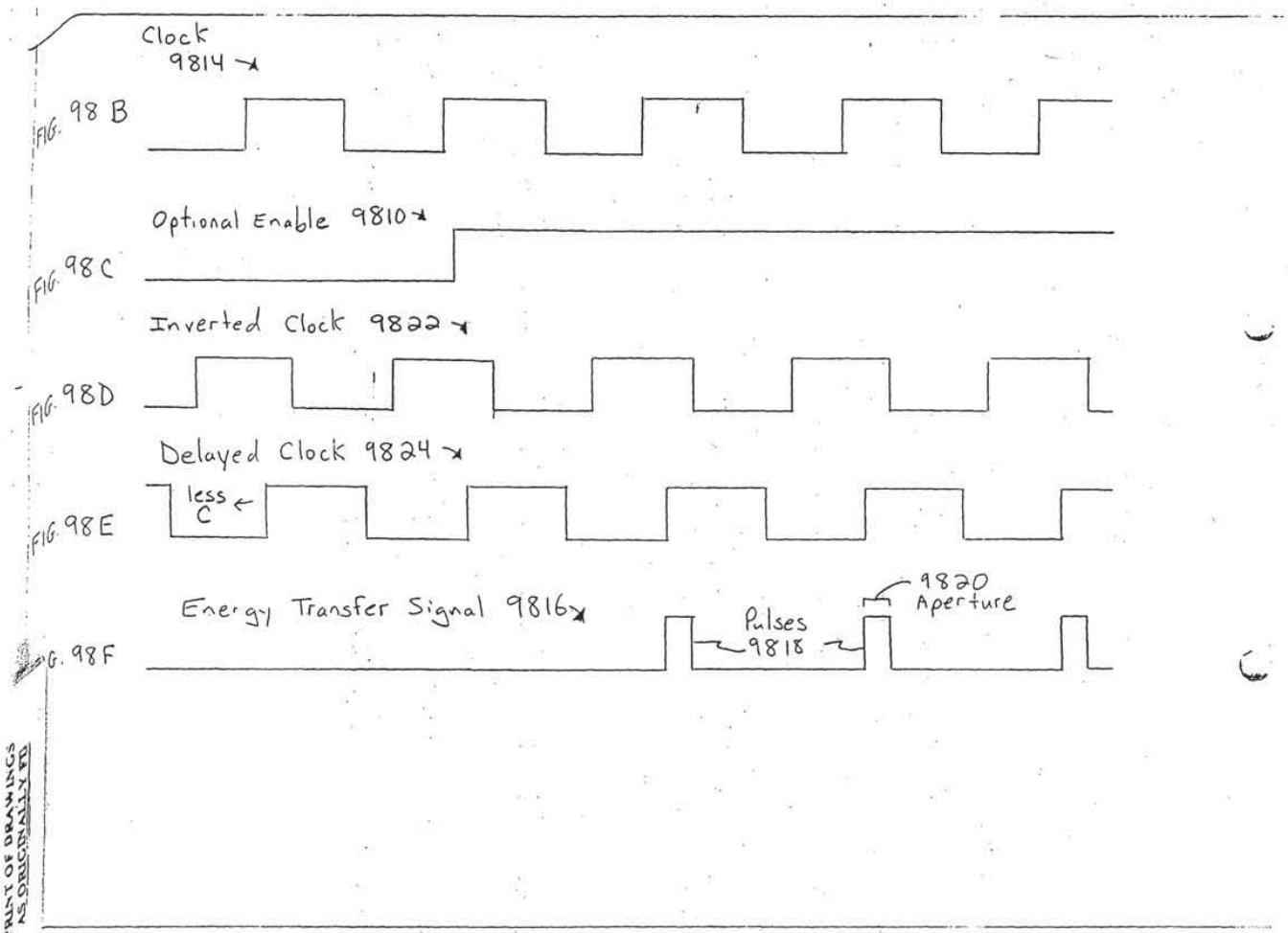


FIG. 98 A

PRINT OF DRAWINGS
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PRINT OF DRAWINGS AS ORIGINALLY FILED

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PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG 99

PRINT OF DRAWINGS
AS ORIGINALLY FIL

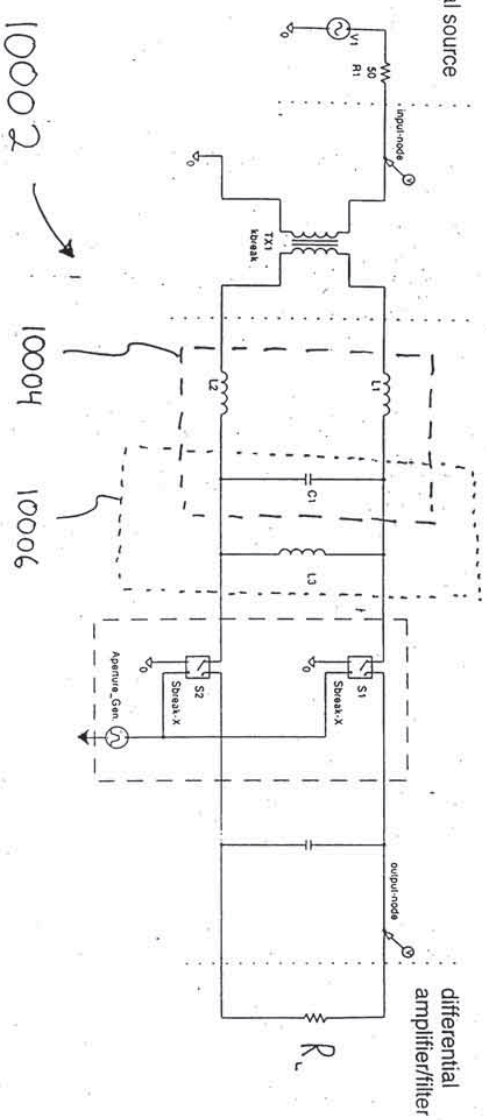
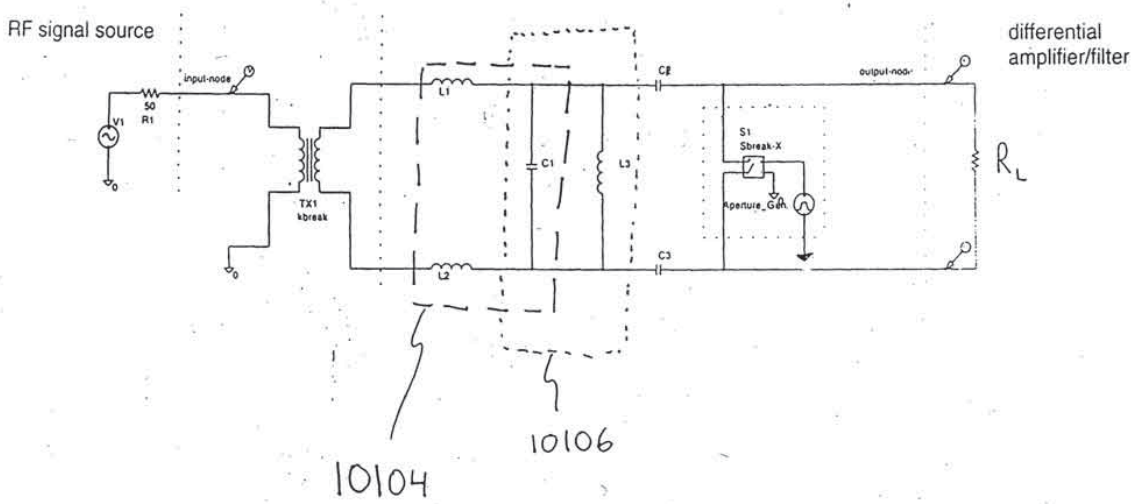


FIG. 100



10102

FIG. 101

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879 .030900

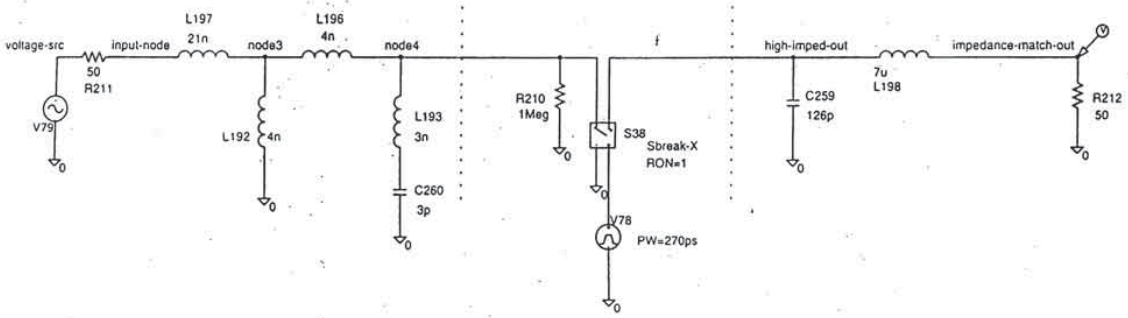
PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 102

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AS ORIGINALLY FIL

CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-915M-5M-hieff.sch



CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-smaperture915M-5M-hieff.sch

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG 104

0052197.030000

PRINT OF DRAWINGS
AS ORIGINALLY FI

CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-bypass-915M-5M-hieff.sch

Fig 105

PRINT OF DRAWINGS
AS ORIGINALLY FI

CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-wobypass-915M-5M-hieff.sch

Fig. 106

PRINT OF DRAWINGS
AS ORIGINALLY FILED

107A

107B

PRINT OF DRAWINGS
AS ORIGINALLY FI

PRINT OF DRAWINGS
AS ORIGINALLY FILED

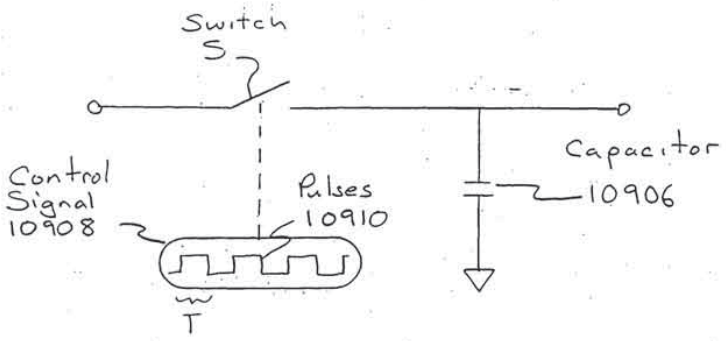


FIG. 109A

PRINT OF DRAWINGS
AS ORIGINALLY FILED

$$q=C\cdot V \qquad \text{EQ. 10}$$

$$V=A\cdot\sin(t) \qquad \text{EQ. 11}$$

$$q(t)=C\cdot A\cdot\sin(t) \qquad \text{EQ. 12}$$

$$\Delta q(t)=C\cdot A\cdot\sin(t)-C\cdot A\cdot\sin(t-T) \qquad \text{EQ. 13}$$

$$\Delta q(t)=C\cdot A\cdot(\sin(t)-\sin(t-T)) \qquad \text{EQ. 14}$$

$$\sin(\alpha)-\sin(\beta)=2\cdot\sin\left(\frac{\alpha-\beta}{2}\right)\cdot\cos\left(\frac{\alpha+\beta}{2}\right) \qquad \text{EQ. 15}$$

$$\Delta q(t)=2\cdot C\cdot A\cdot\sin\left[\frac{t-(t-T)}{2}\right]\cdot\cos\left[\frac{t+(t-T)}{2}\right] \qquad \text{EQ. 16}$$

$$\Delta q(t)=2\cdot C\cdot A\cdot\sin\left(\frac{1}{2}\cdot T\right)\cdot\cos\left(t-\frac{1}{2}\cdot T\right) \qquad \text{EQ. 17}$$

$$q(t)=\int_{\bullet}^{\bullet} C\cdot A\cdot(\sin(t)-\sin(t-T))\,dt \qquad \text{EQ. 18}$$

$$q(t)=-\cos(t)\cdot C\cdot A+\cos(t-T)\cdot C\cdot A \qquad \text{EQ. 19}$$

$$q(t)=C\cdot A\cdot(\cos(t-T)-\cos(t)) \qquad \text{EQ. 20}$$

FIG. 109B

PRINT OF DRAWINGS
AS ORIGINALLY FI

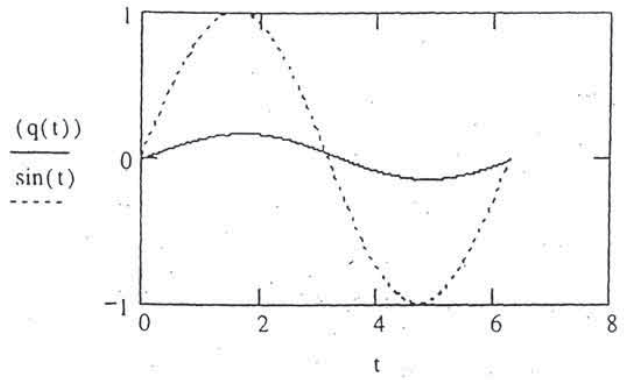
Graph 1

C=1;A=.5,T=¶

FIG. 109C

PRINT OF DRAWINGS
AS ORIGINALLY FT

For Graph 2: C=1, A=.5, T=π/10:



Graph 2

FIG. 109D

PRINT OF DRAWINGS
AS ORIGINALLY FT

Power - Charge Relationship

$$q = C \cdot V \qquad \text{EQ. 21}$$

$$V = \frac{q}{C} \qquad \text{EQ. 22}$$

$$V = \frac{J}{C} \qquad \text{EQ. 23}$$

$$J = \frac{q^2}{C} \qquad \text{EQ. 24}$$

$$P = \frac{J}{S} \qquad \text{EQ. 25}$$

$$P = \frac{q^2}{C \cdot S} \qquad \text{EQ. 26}$$

FIG. 109E

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AS ORIGINALLY FI

Insertion Loss

Insertion loss in dB is expressed by:

$$ILdB = 10 \cdot \log \frac{Pin}{Pout}$$

or

$$ILdB = 10 \cdot \log \left[\frac{\left(\frac{Vin^2}{Rin} \right)}{\left(\frac{Vout^2}{Rout} \right)} \right]$$

FIG. 109F

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AS ORIGINALLY FILED

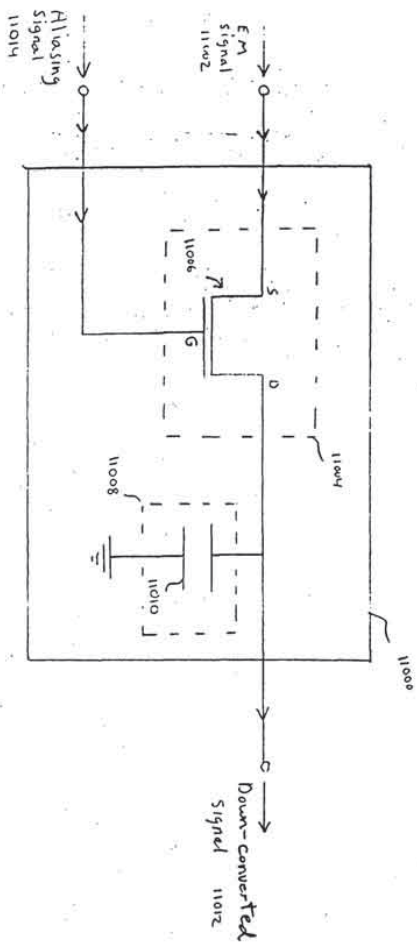


FIG 11A

PRINT OF DRAWINGS
AS ORIGINALLY FIL

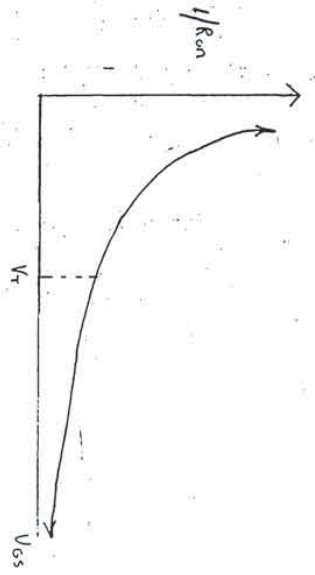


FIG 1108

PRINT OF DRAWINGS
AS ORIGINALLY FIL

PRINT OF DRAWINGS
AS ORIGINALLY FI

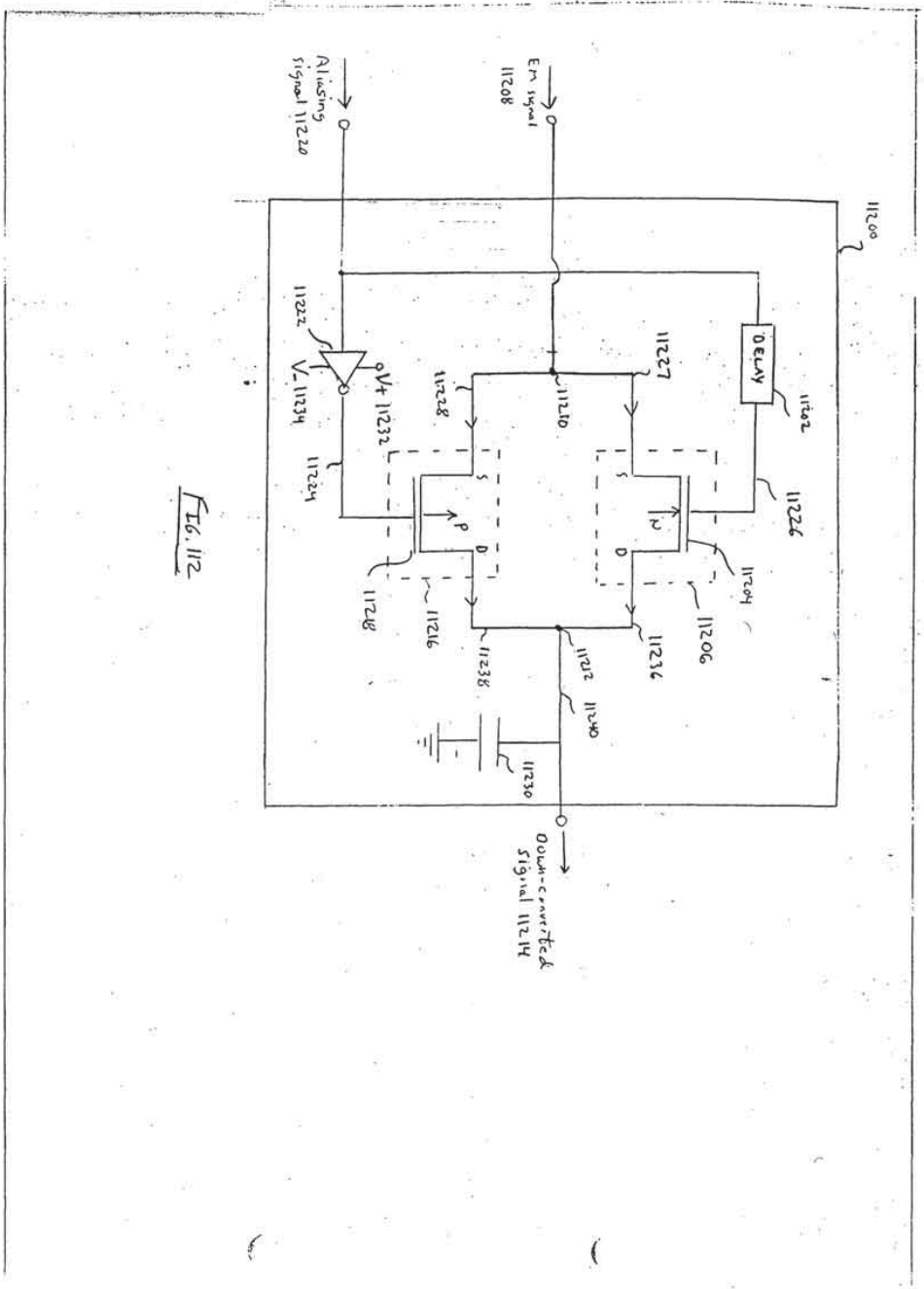


FIG. 112

PRINT OF DRAWINGS
AS ORIGINALLY FI

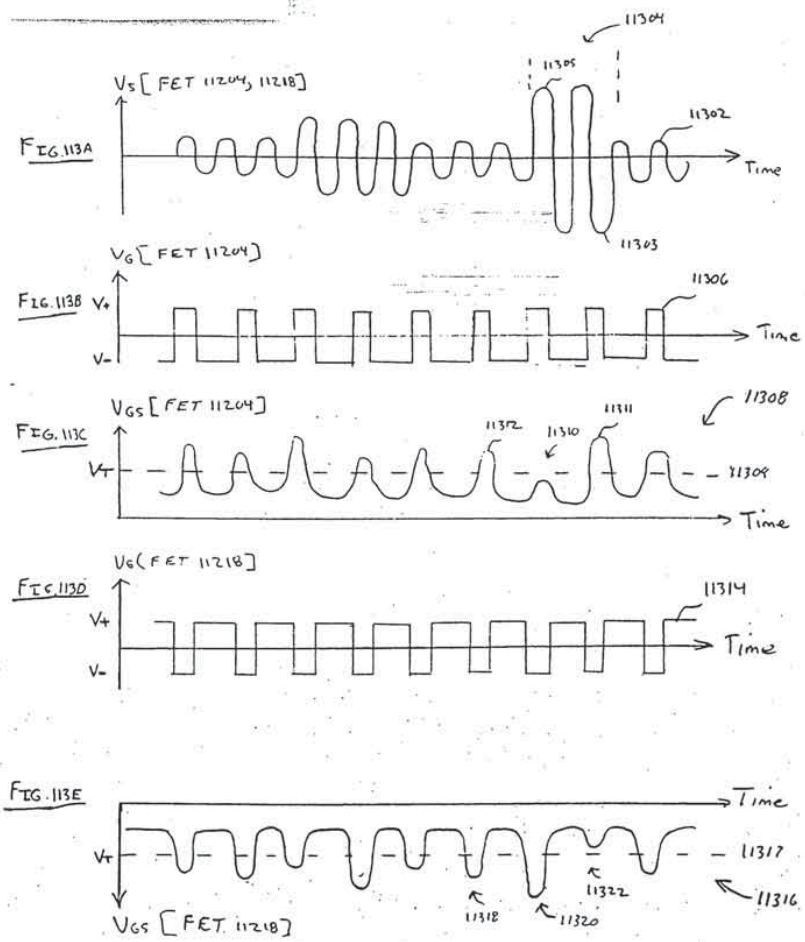


FIG. 113A

FIG. 113B

FIG. 113C

FIG. 113D

FIG. 113E

PRINT OF DRAWINGS
AS ORIGINALLY FI

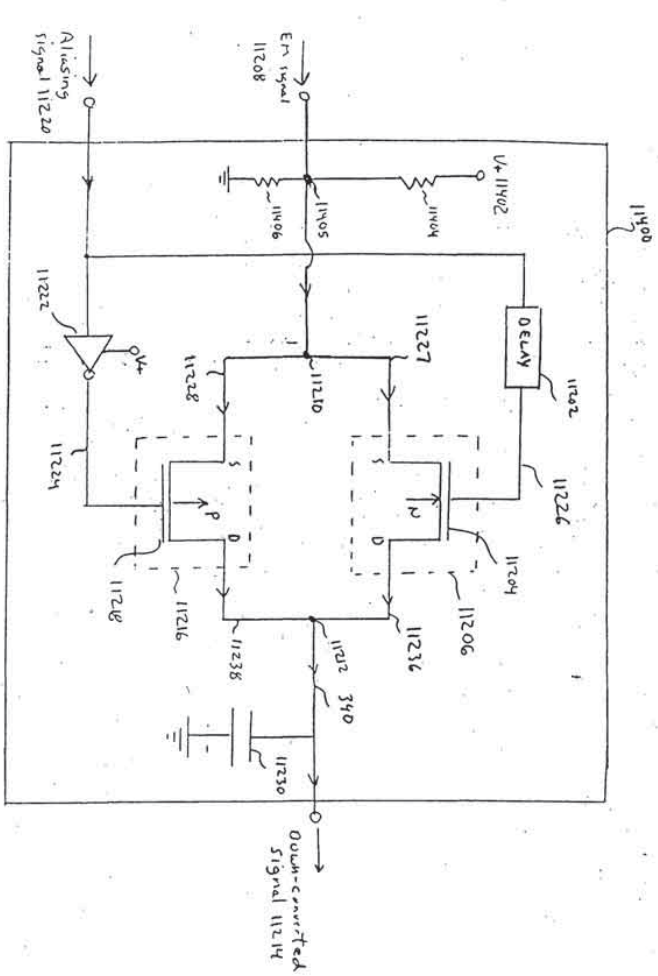


FIG. 11

PRINT OF DRAWINGS
AS ORIGINALLY FILED

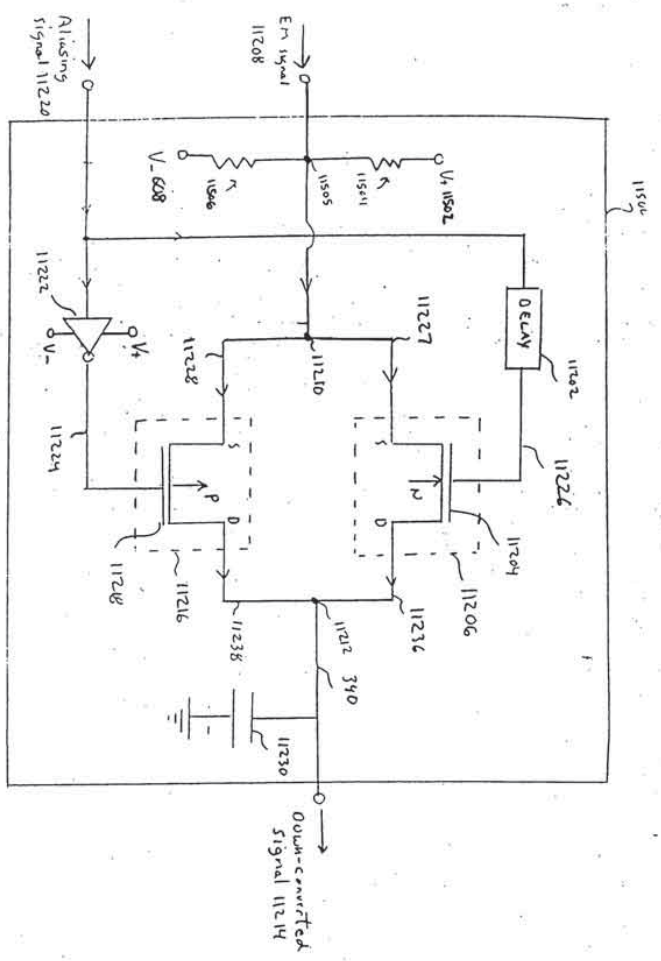


FIG. 11B

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PRINT OF DRAWINGS
AS ORIGINALLY FILED

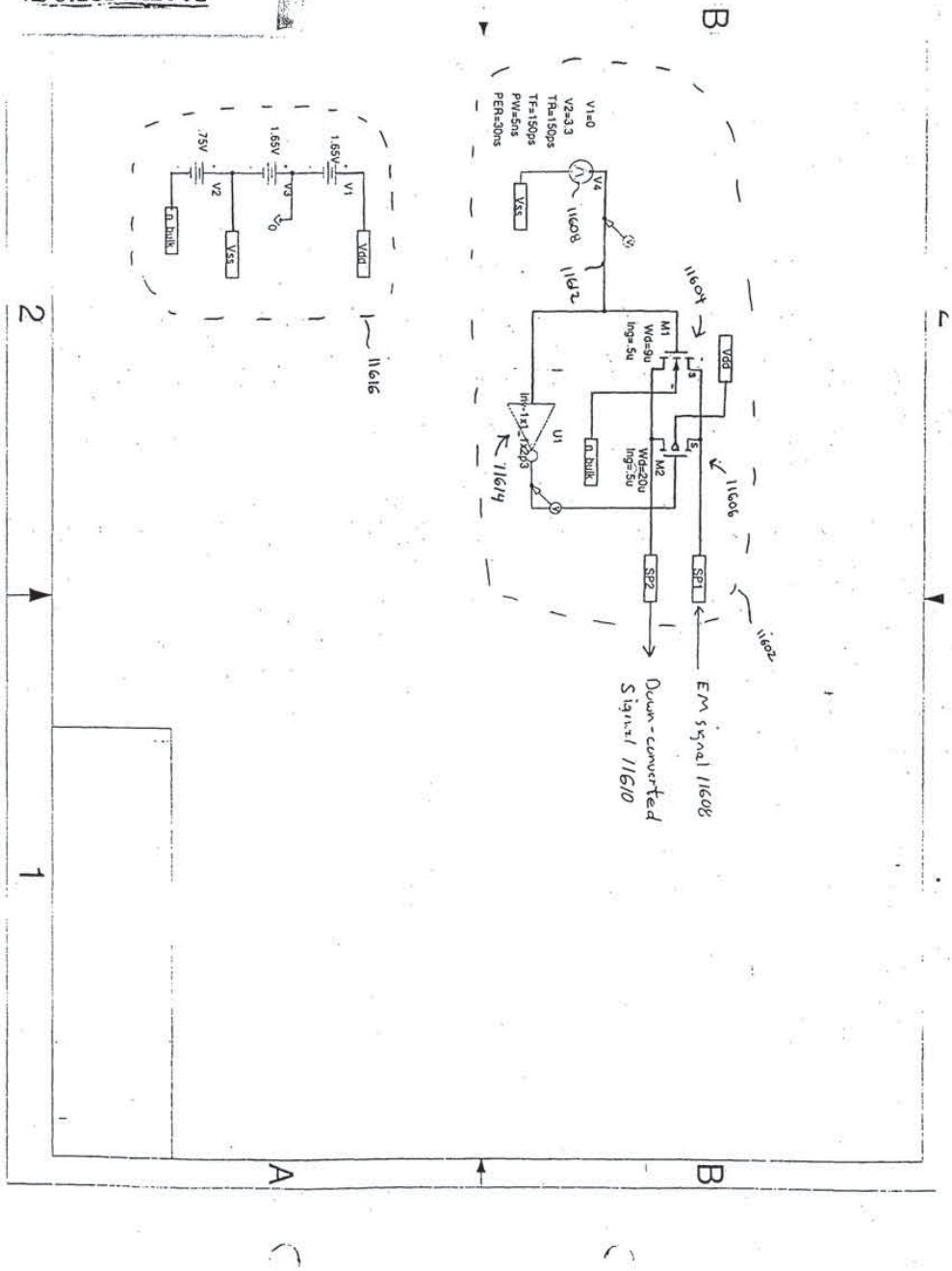


FIG. 116

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FIG. 11

PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 118

FIG. 119

FIG. 120

PRINT OF DRAWINGS
AS ORIGINALLY FT

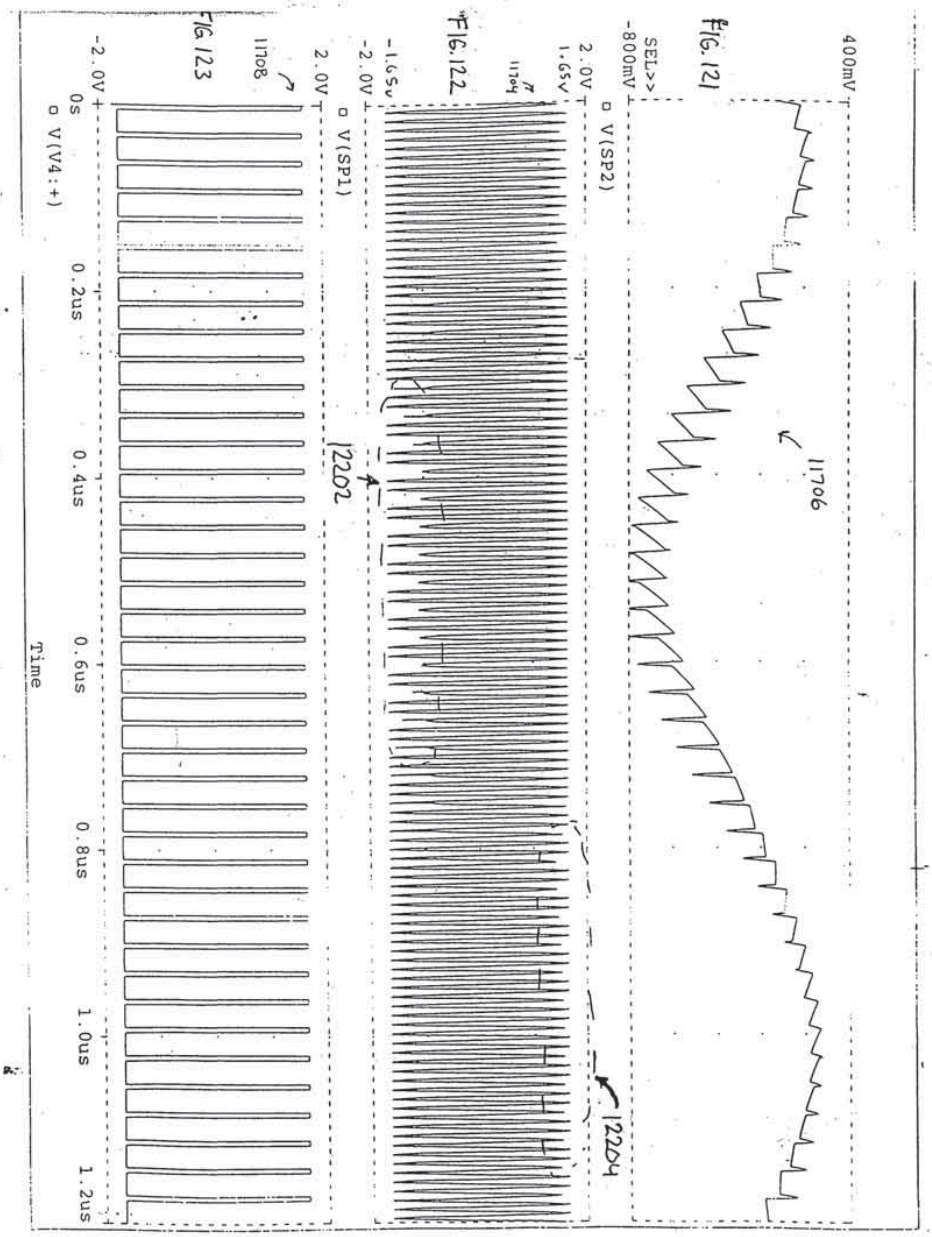


FIG. 121

FIG. 122

FIG. 123

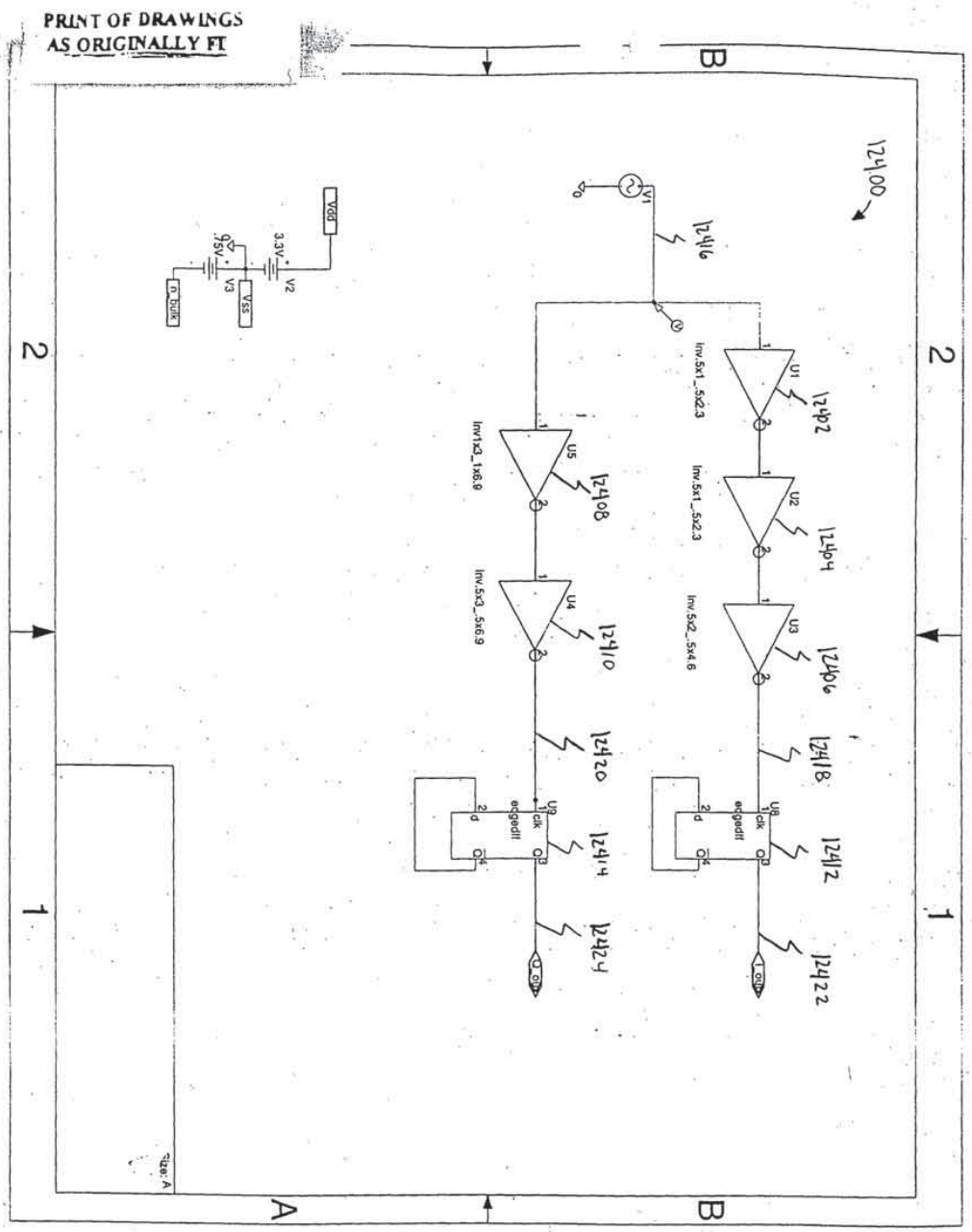

PRINT OF DRAWINGS
AS ORIGINALLY FT
12400
12416
12402
12404
12406
12418
12412
12422
12408
12410
12420
12414
12424
Vdd
3.3V
.95V
V1
V2
V3
Vss
n_bulk
inv.5x1_5x2.3
inv.5x2_5x4.6
inv1x2_1x6.9
inv.5x3_5x6.9
edgedff
clk
d
q
1 out
Q out
A
B
1
2

FIG. 12A

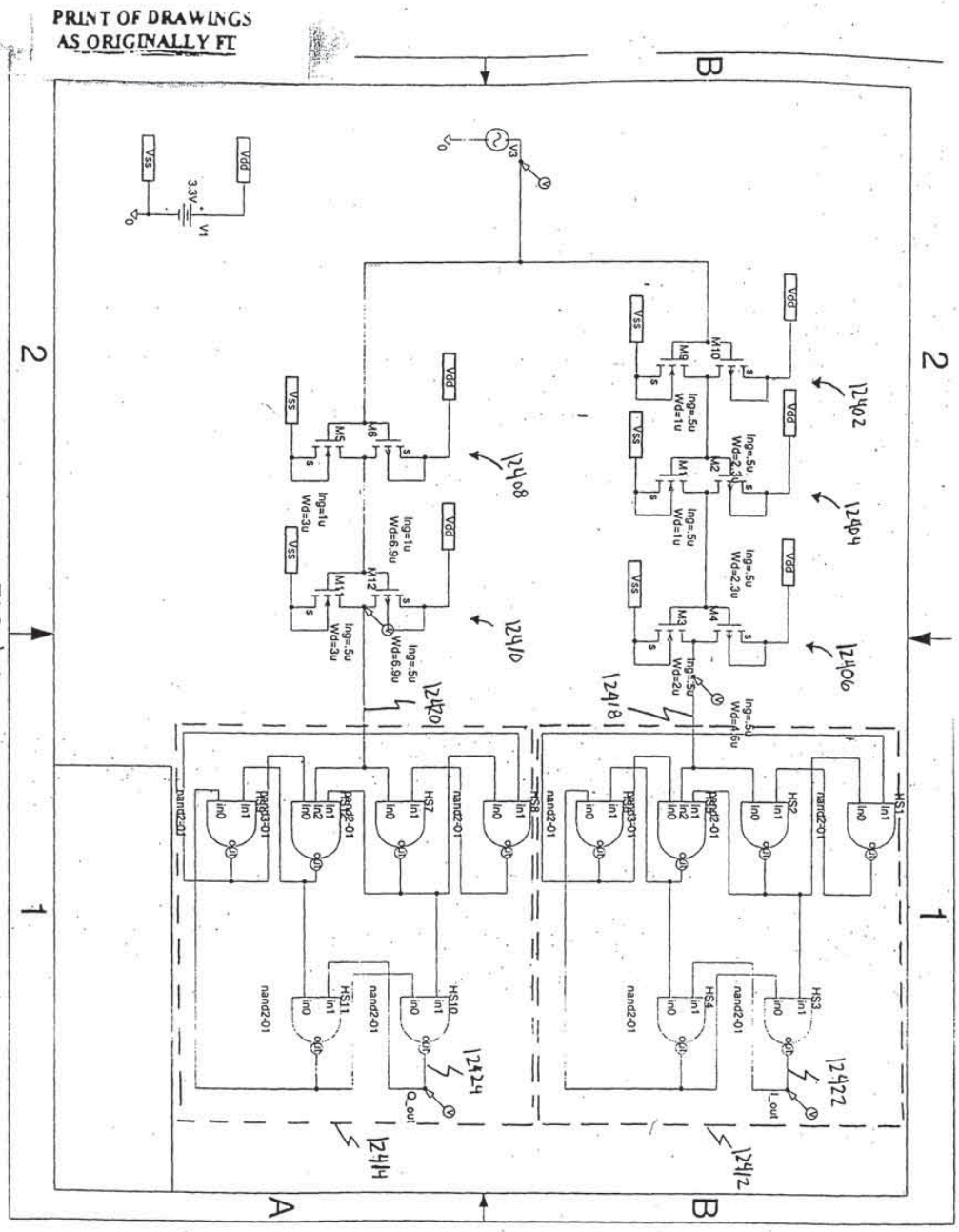

PRINT OF DRAWINGS
AS ORIGINALLY FT
B
2
1
A
Vss
Vdd
3.3V
V1
V3
M10
M9
M8
M5
M6
M1
M2
M11
M12
M3
M4
Ing=5u
Wd=1u
Ing=5u
Wd=2.3u
Ing=1u
Wd=3u
Ing=1u
Wd=6.9u
Ing=5u
Wd=3u
Ing=5u
Wd=6.9u
Ing=5u
Wd=2u
Ing=5u
Wd=4.6u
12402
12404
12406
12408
12410
12418
12420
12422
12424
12412
12414
nand2-01
nand3-01
HS1
HS2
HS3
HS4
HS7
HS8
HS10
HS11
in0
in1
in2
out
I_out
O_out

FIG. 12B

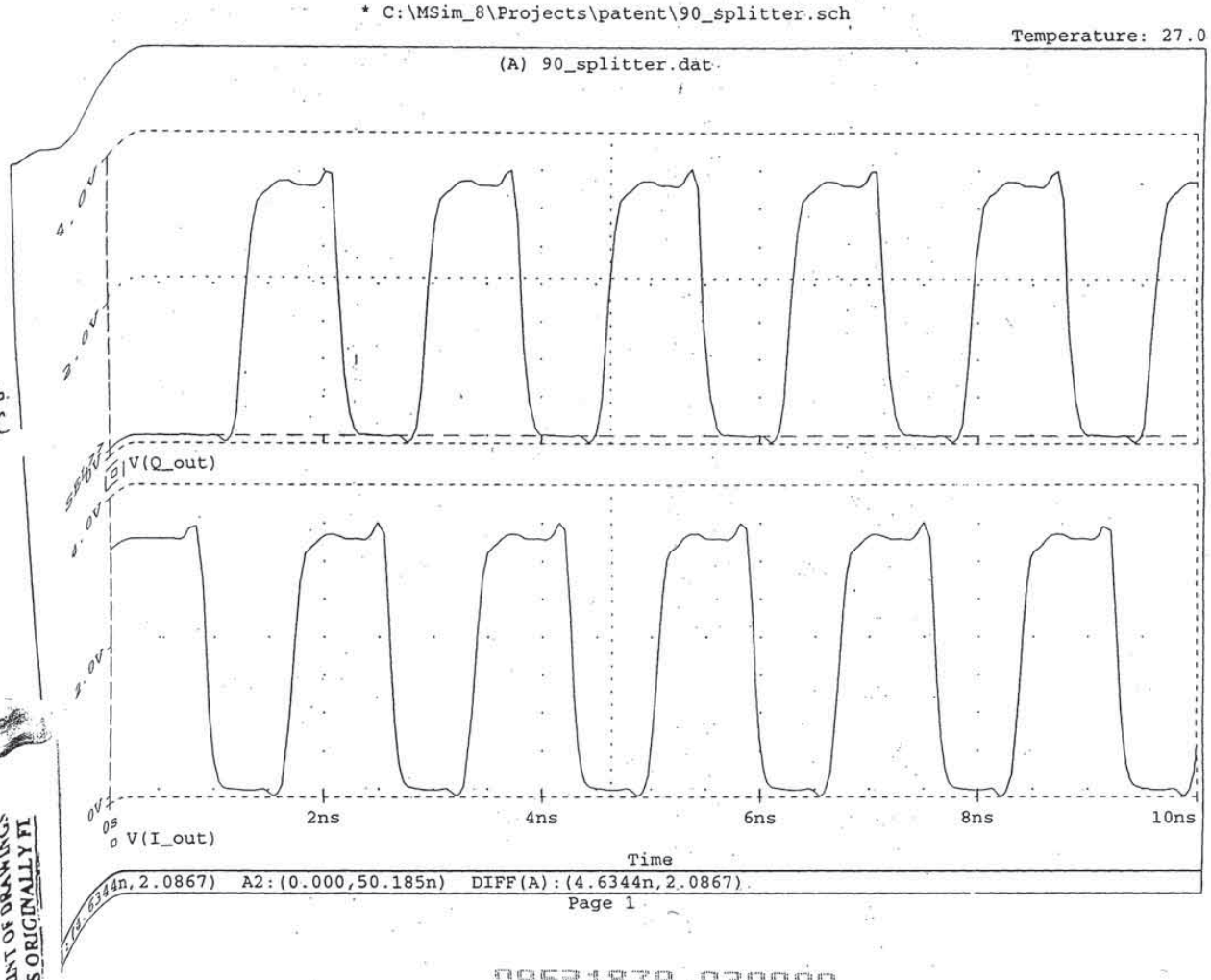


FIG. 12C

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811

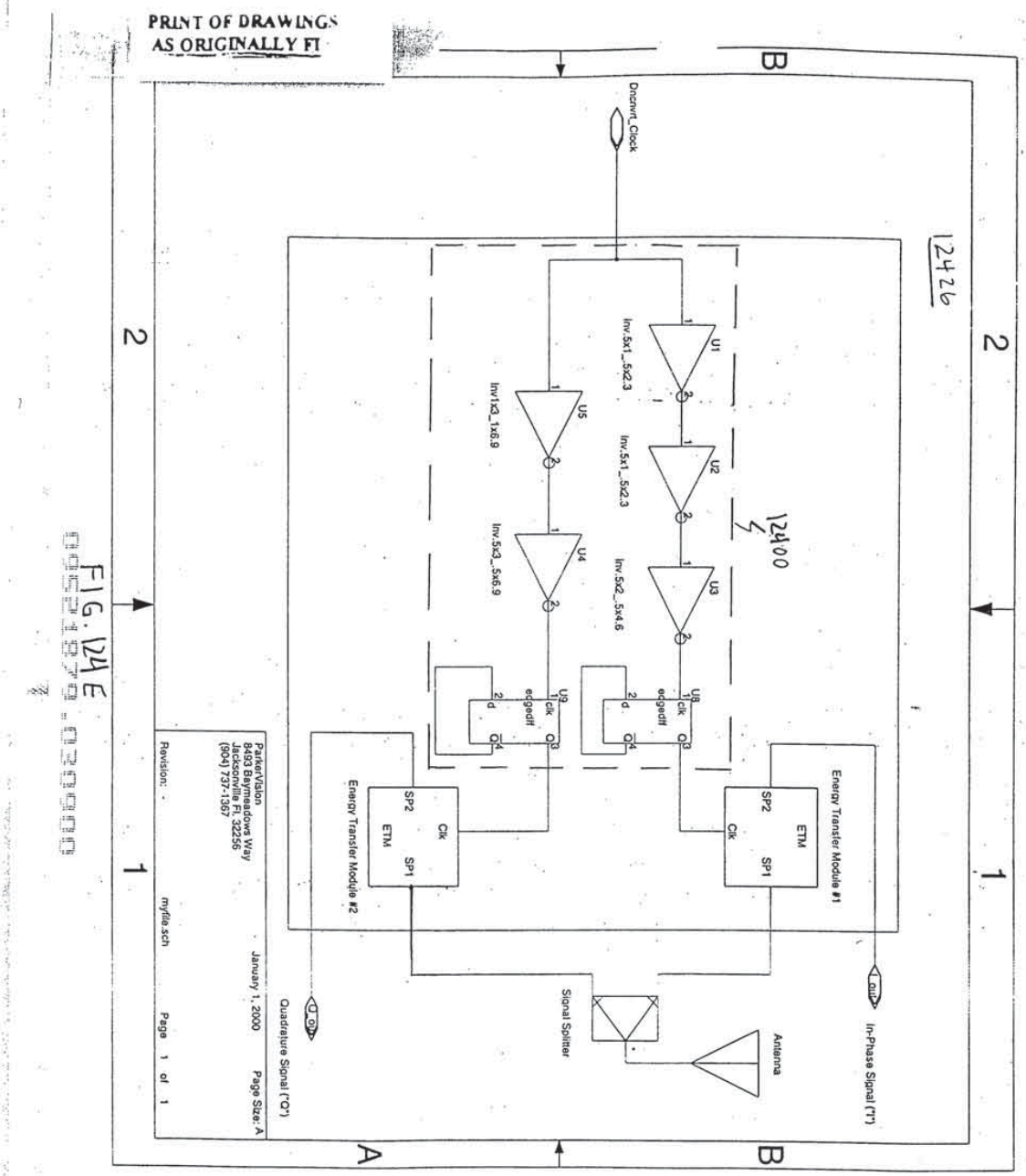
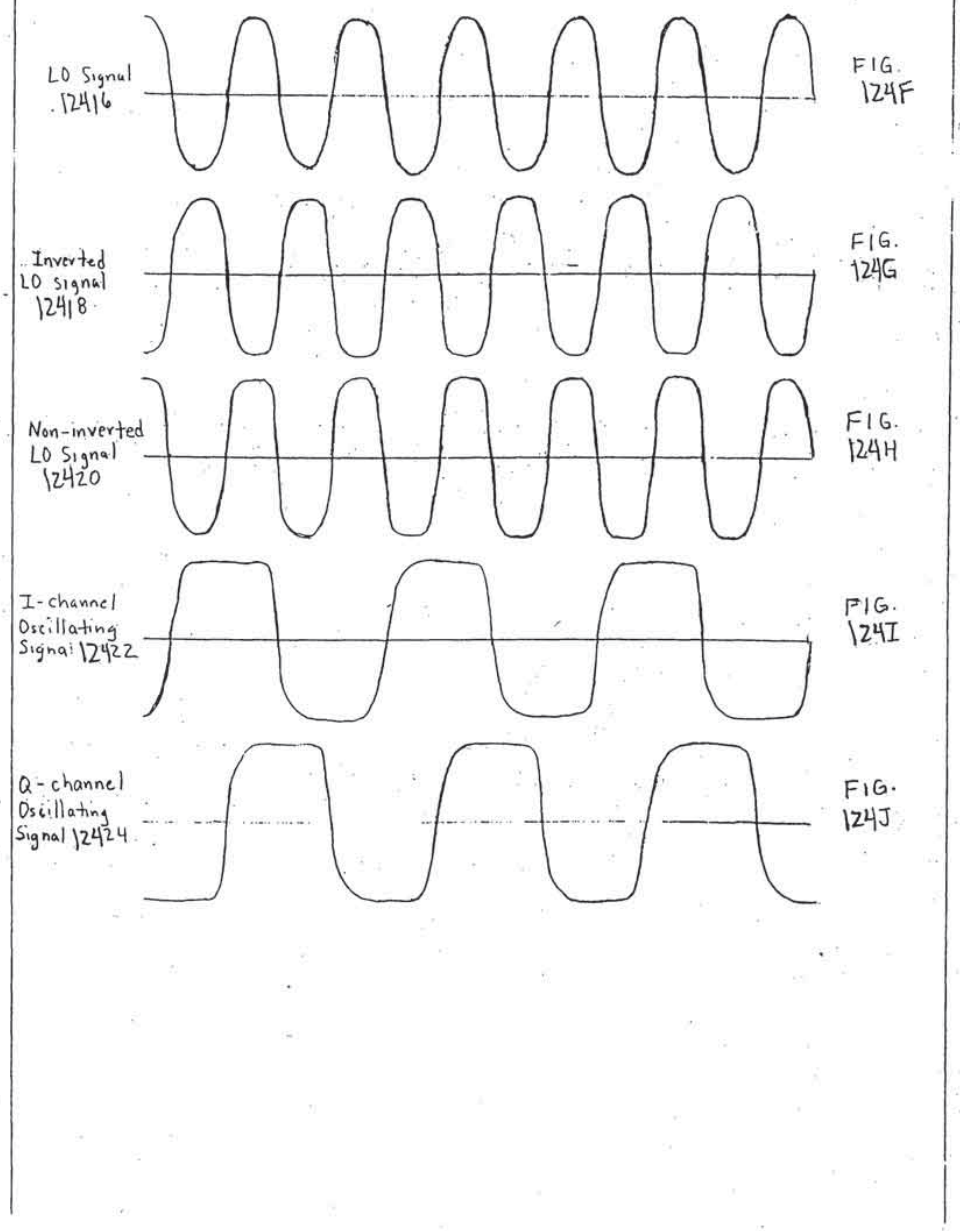

PRINT OF DRAWINGS
AS ORIGINALLY FI
DiscrvrI_Clock
1242b
1240O
U1
U2
U3
U4
U5
Inv.5x1_-5x2.3
Inv.5x1_-5x2.3
Inv.5x2_-5x4.6
Inv.5x3_-5x6.9
Inv1x3_1x6.9
U9
U8
clk
eqpdff
d
Q
Energy Transfer Module #1
Energy Transfer Module #2
SP2
ETM
SP1
Clk
Signal Splitter
Antanna
In-Phase Signal ("I")
Quadrature Signal ("Q")
ParkerVision
8493 Baymeadows Way
Jacksonville FL 32256
(904) 737-1367
January 1, 2000
Page Size: A
Revision:
myfile.sch
Page 1 of 1

FIG. 12A

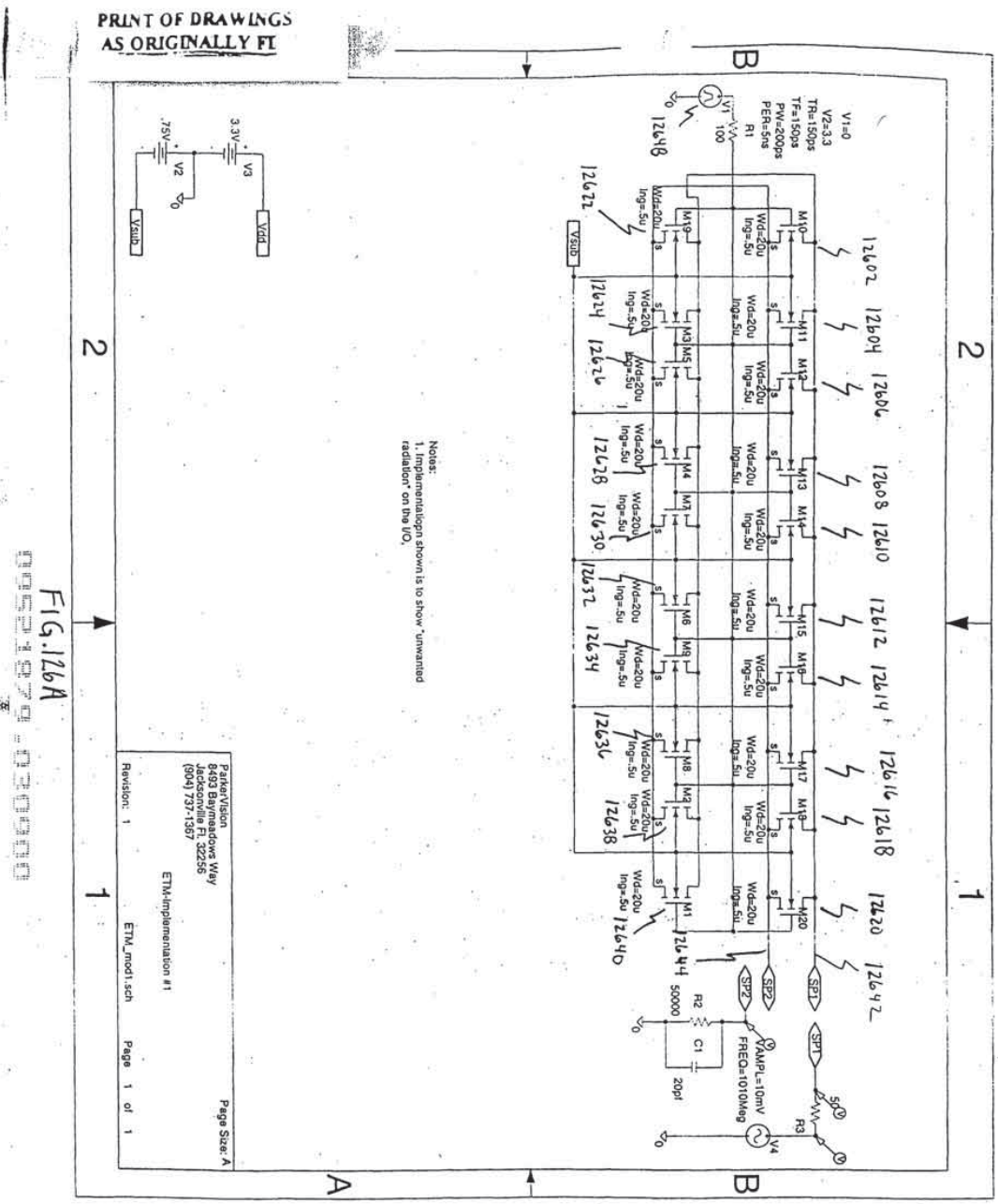
PRINT OF DRAWINGS
AS ORIGINALLY FT

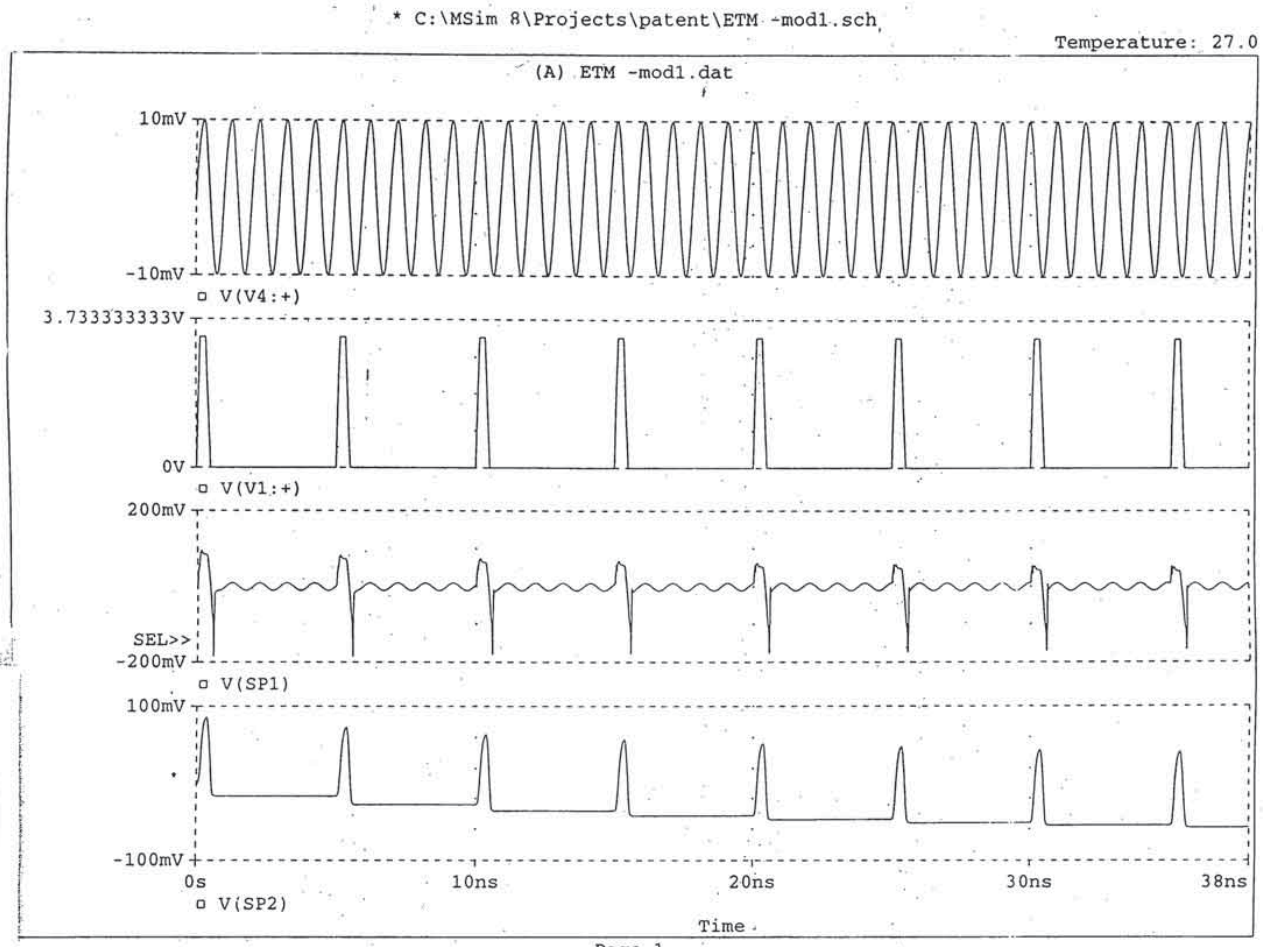
No. 5505
Engineer's Compilation Pad



PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 125


PRINT OF DRAWINGS
AS ORIGINALLY FI
12602
12604
12606
12608
12610
12612
12614
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12620
12622
12624
12626
12628
12630
12632
12634
12636
12638
12640
12642
12644
12646
12648
V1=0
V2=3.3
TR=150ps
TF=150ps
PW=200ps
PER=5ns
R1
100
50000
R2
C1
20pf
R3
50
FREQ=1010Meg
AMPL=10mV
V4
3.3V
V3
.75V
V2
Vdd
Vsub
Wd=20u
lng=5u
Notes:
1. Implementation shown is to show "unwanted
radiation" on the I/O.
ParkerVision
8493 Baymeadows Way
Jacksonville FL 32256
(904) 737-1367
ETM-implemeniation #1
Revision: 1
ETM_mod1.sch
Page 1 of 1
Page Size: A
FIG. 126A



Page 1

FIG 12B

FIG. 12C

FIG. 12D

PRINT OF DRAWINGS AS ORIGINALLY FI

09521979.030900

816

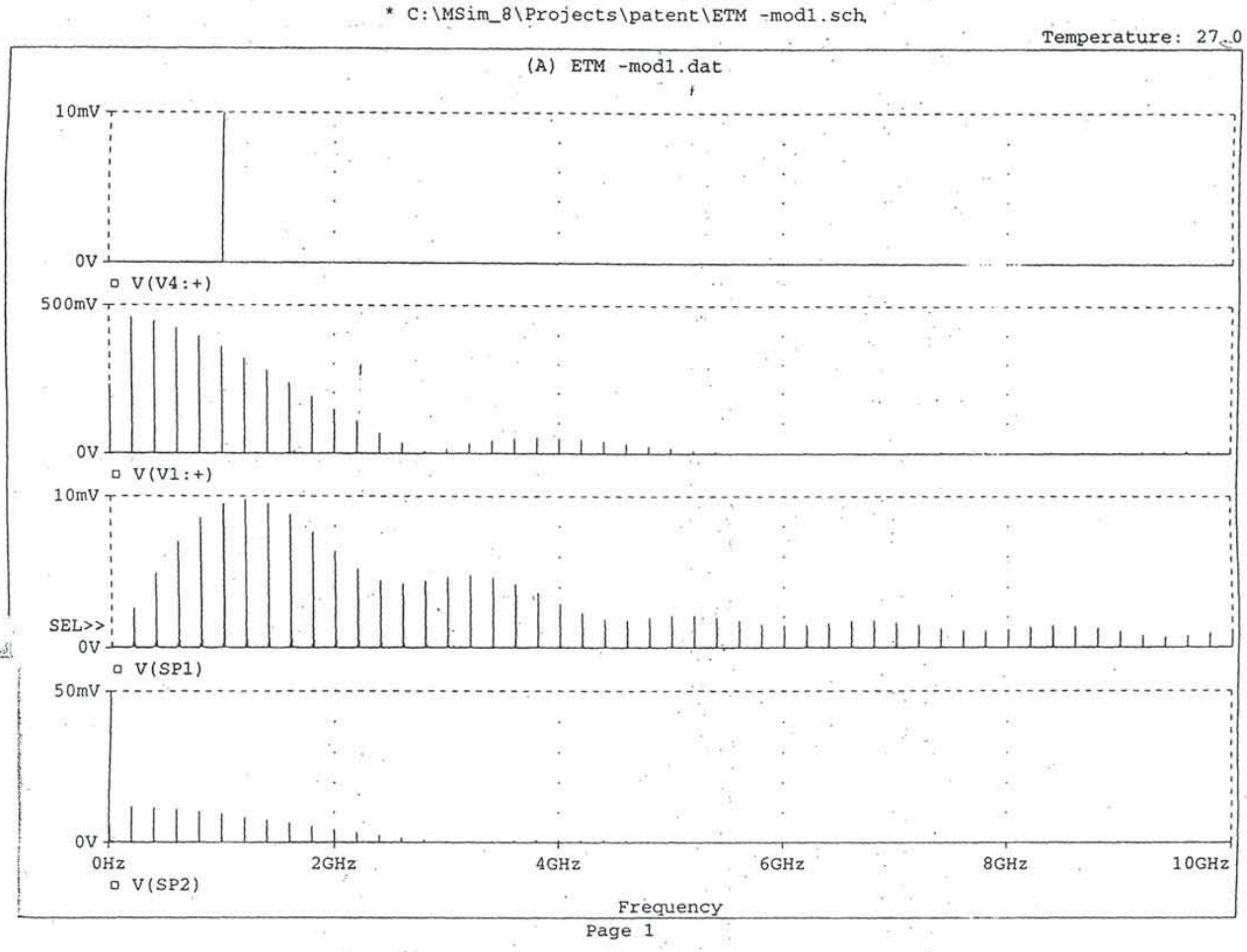


FIG 126F

FIG 126G

FIG 126H

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879.030900

817

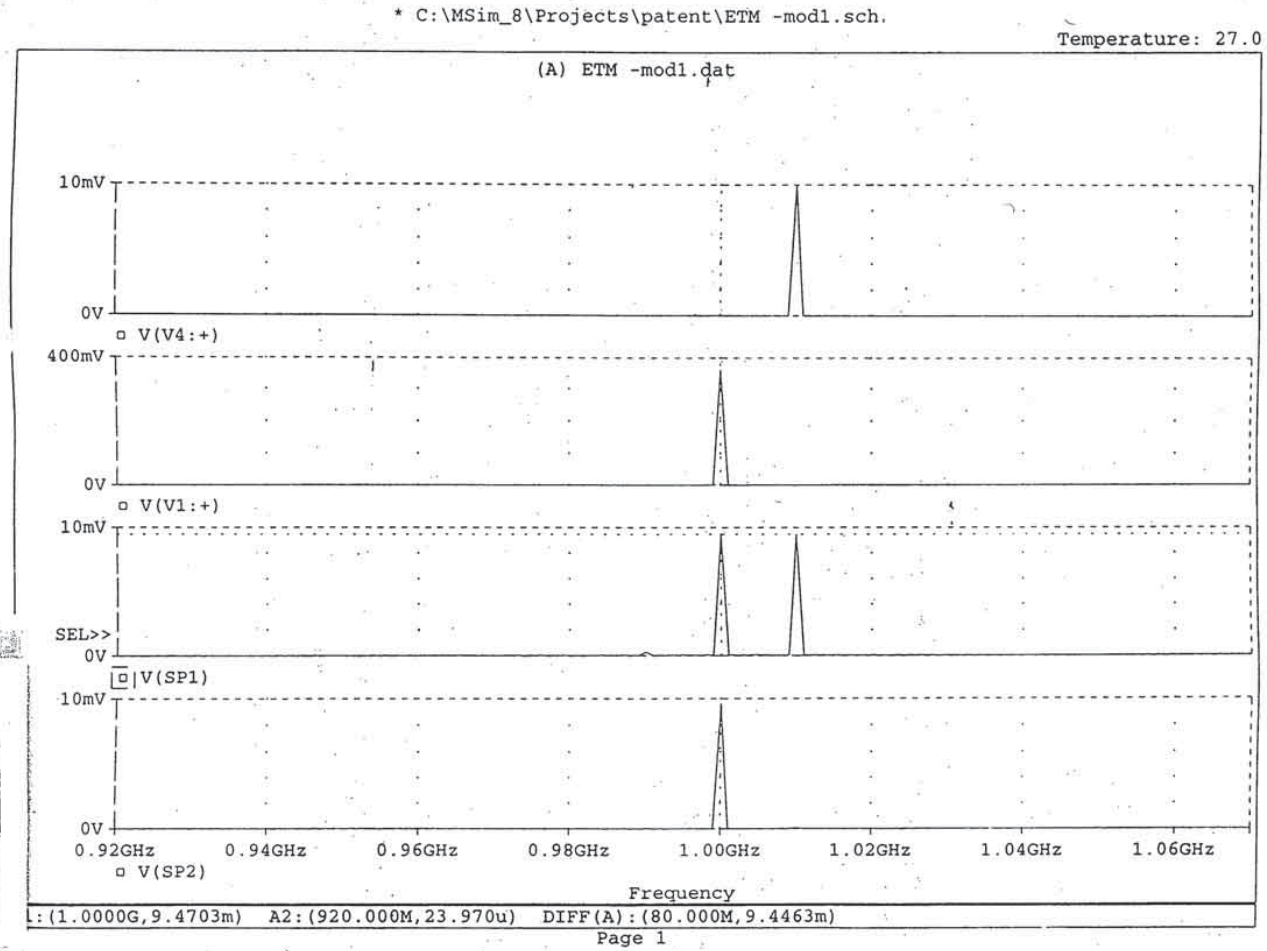


FIG. 126J

FIG. 126K

FIG. 126L

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879_030900

818

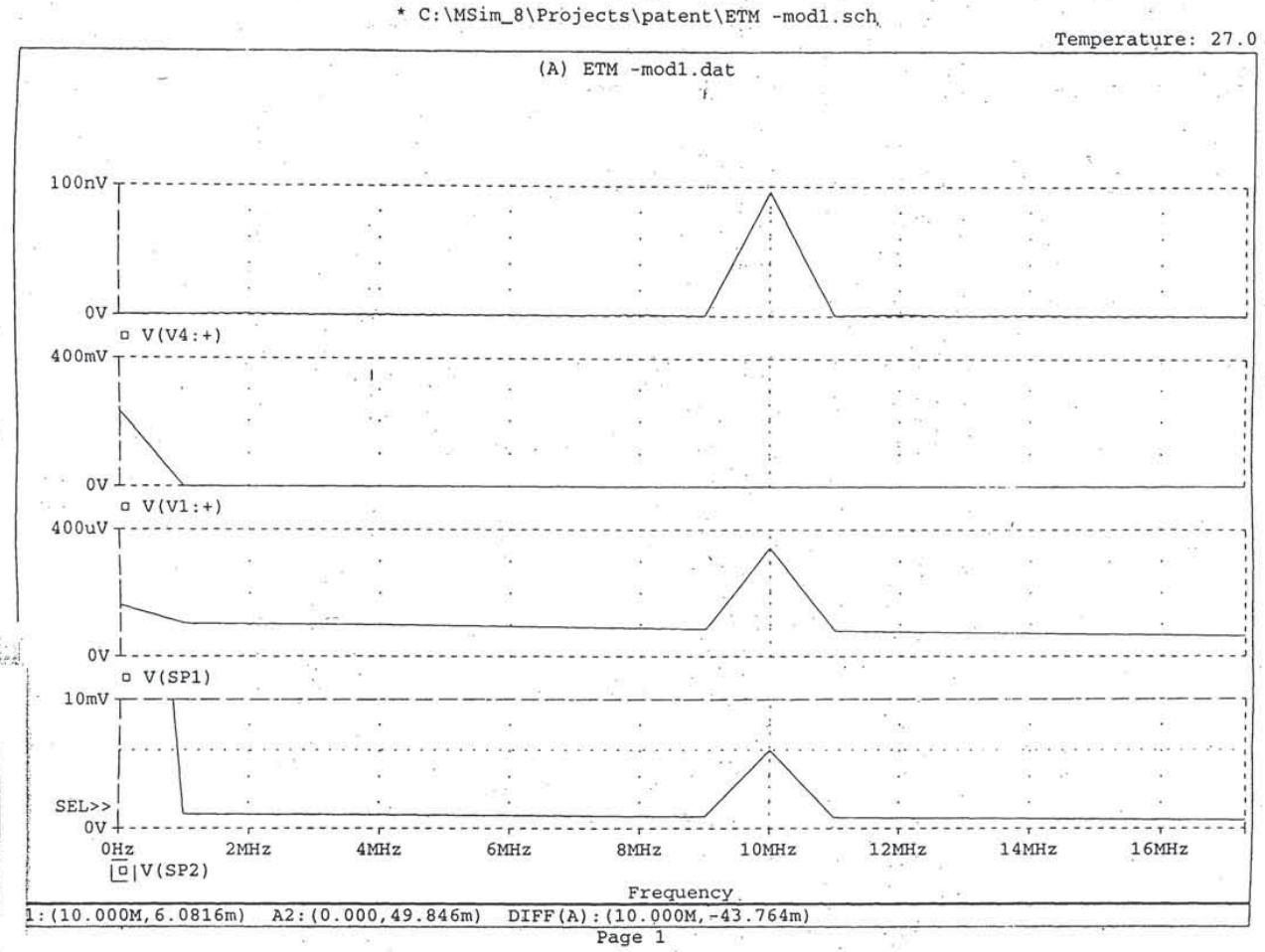


FIG 126N

FIG 126O

FIG 126P

PRINT OF DRAWINGS AS ORIGINALLY FI

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PRINT OF DRAWINGS
AS ORIGINALLY FI

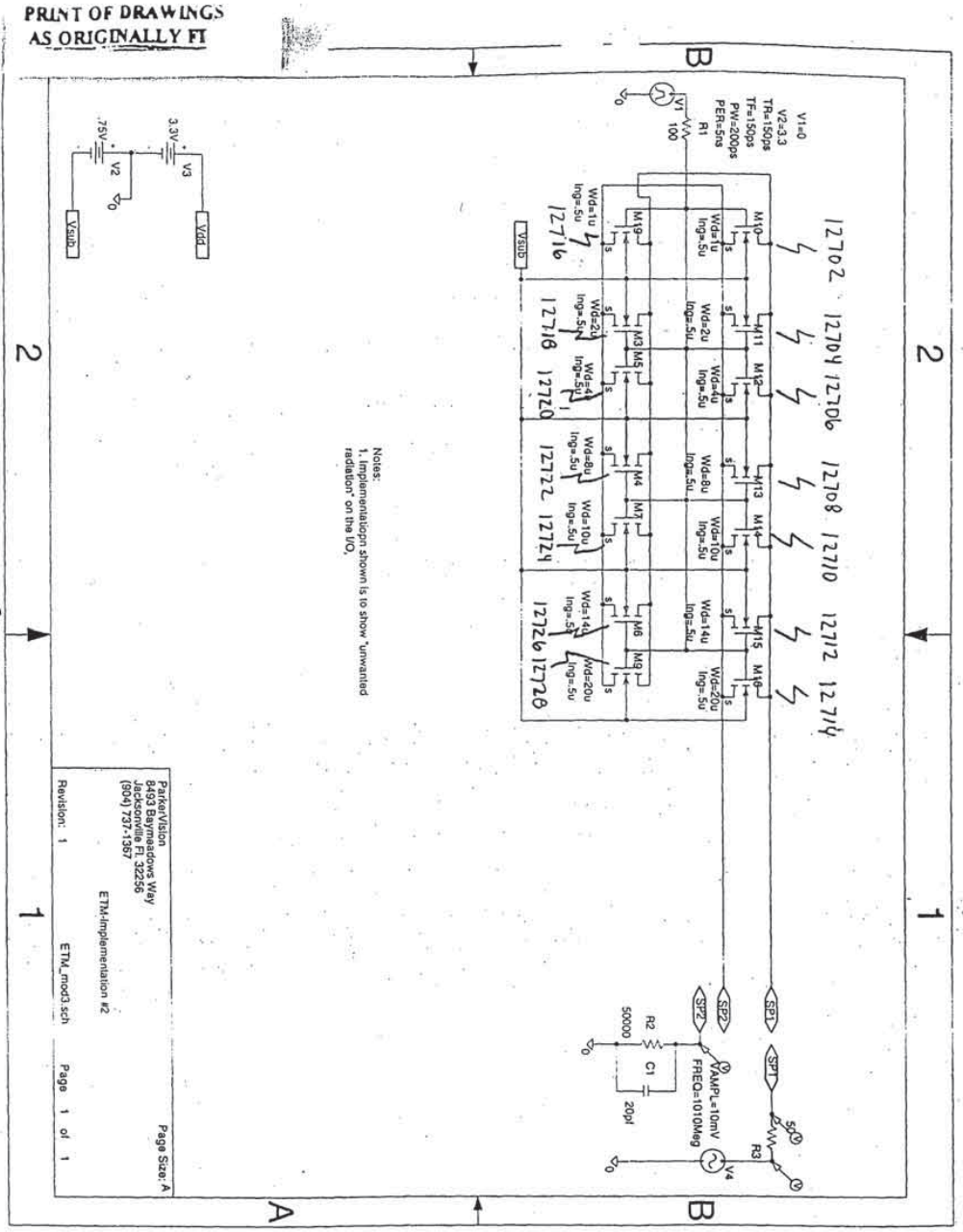
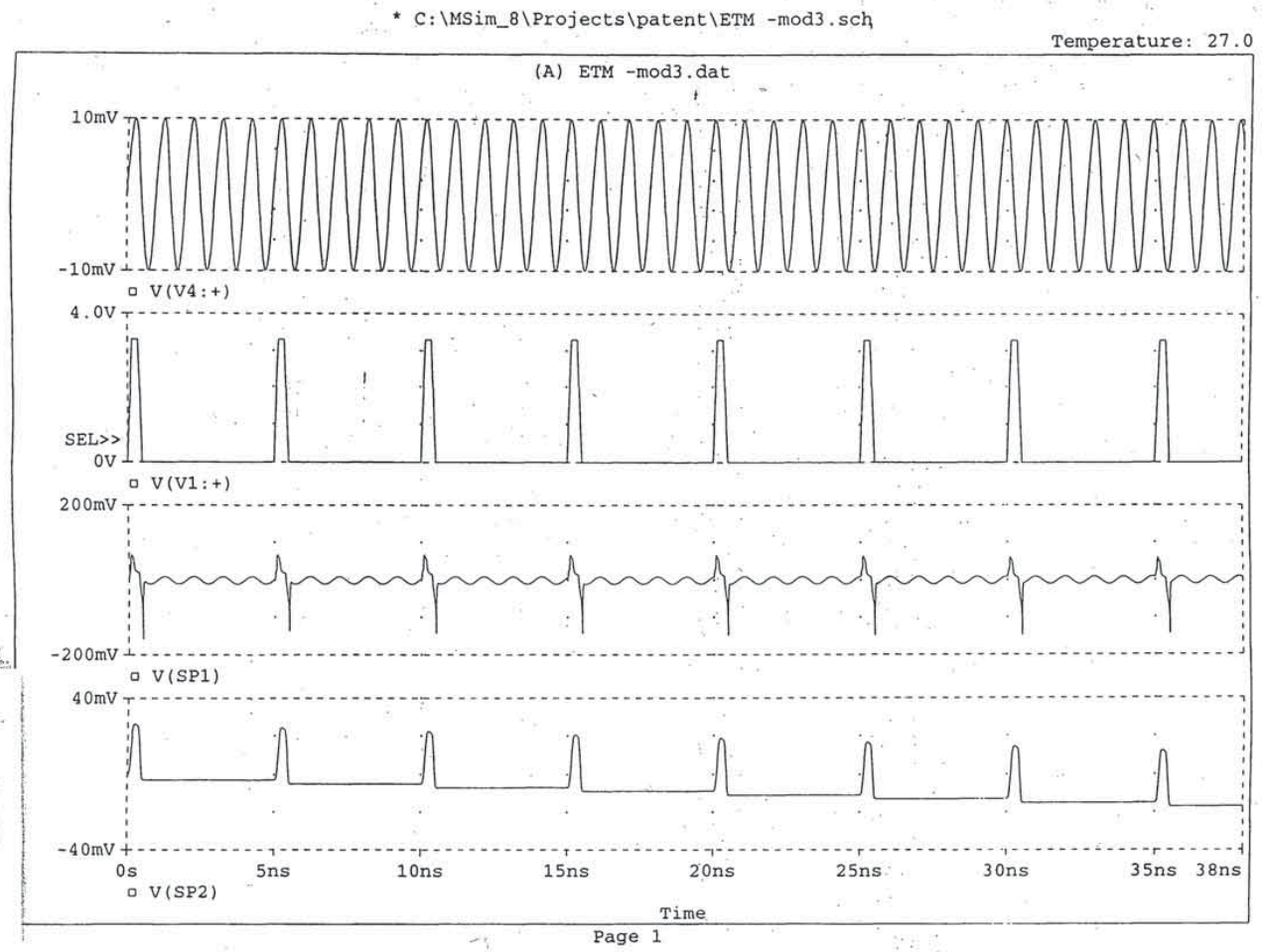


FIG.127A

FIG. 127B

FIG. 127C

FIG. 127D



PRINT OF DRAWINGS AS ORIGINALLY FI

09531979_030900

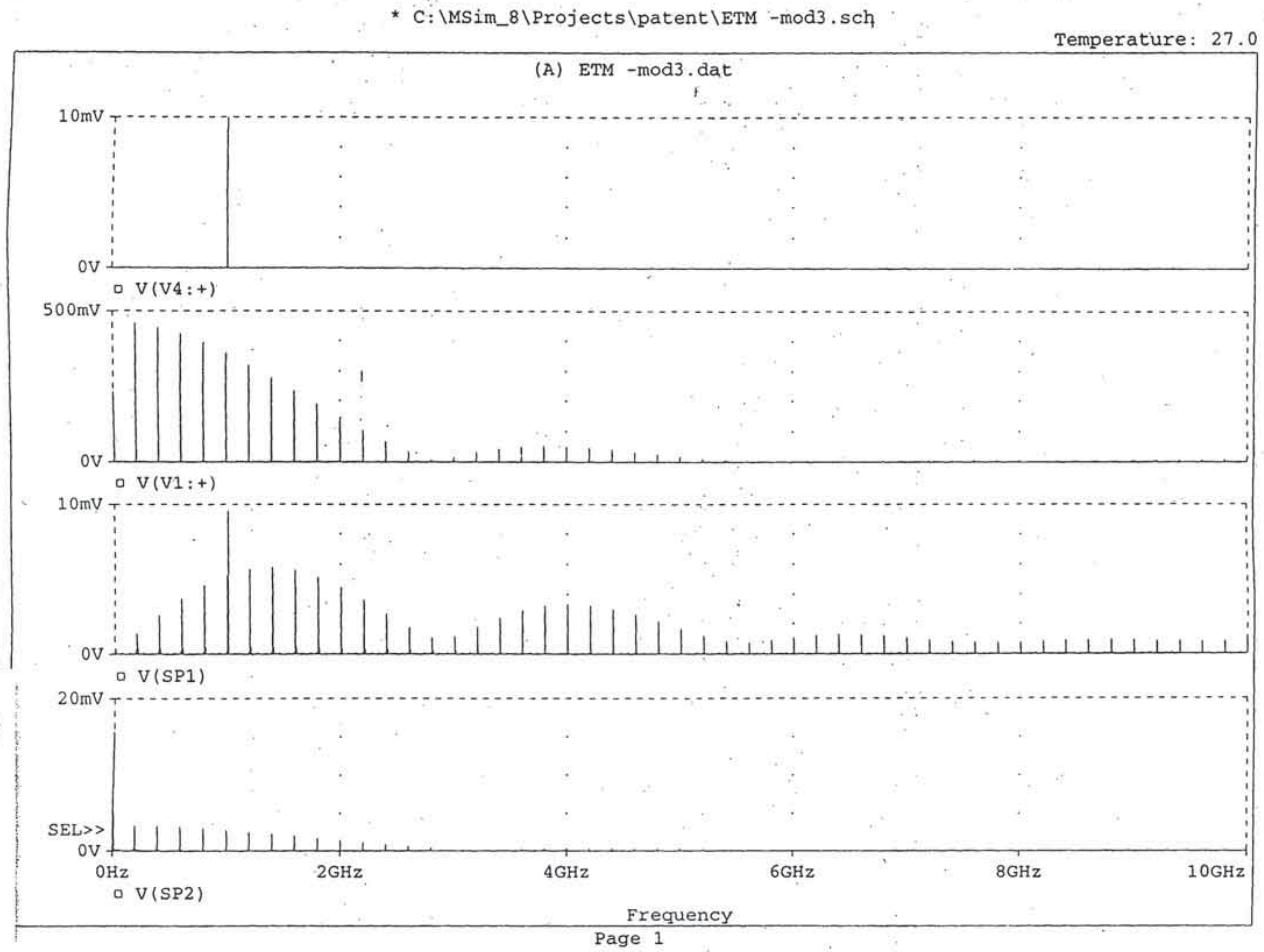


FIG. 127F

FIG. 127G

FIG. 127H

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879.030000

822

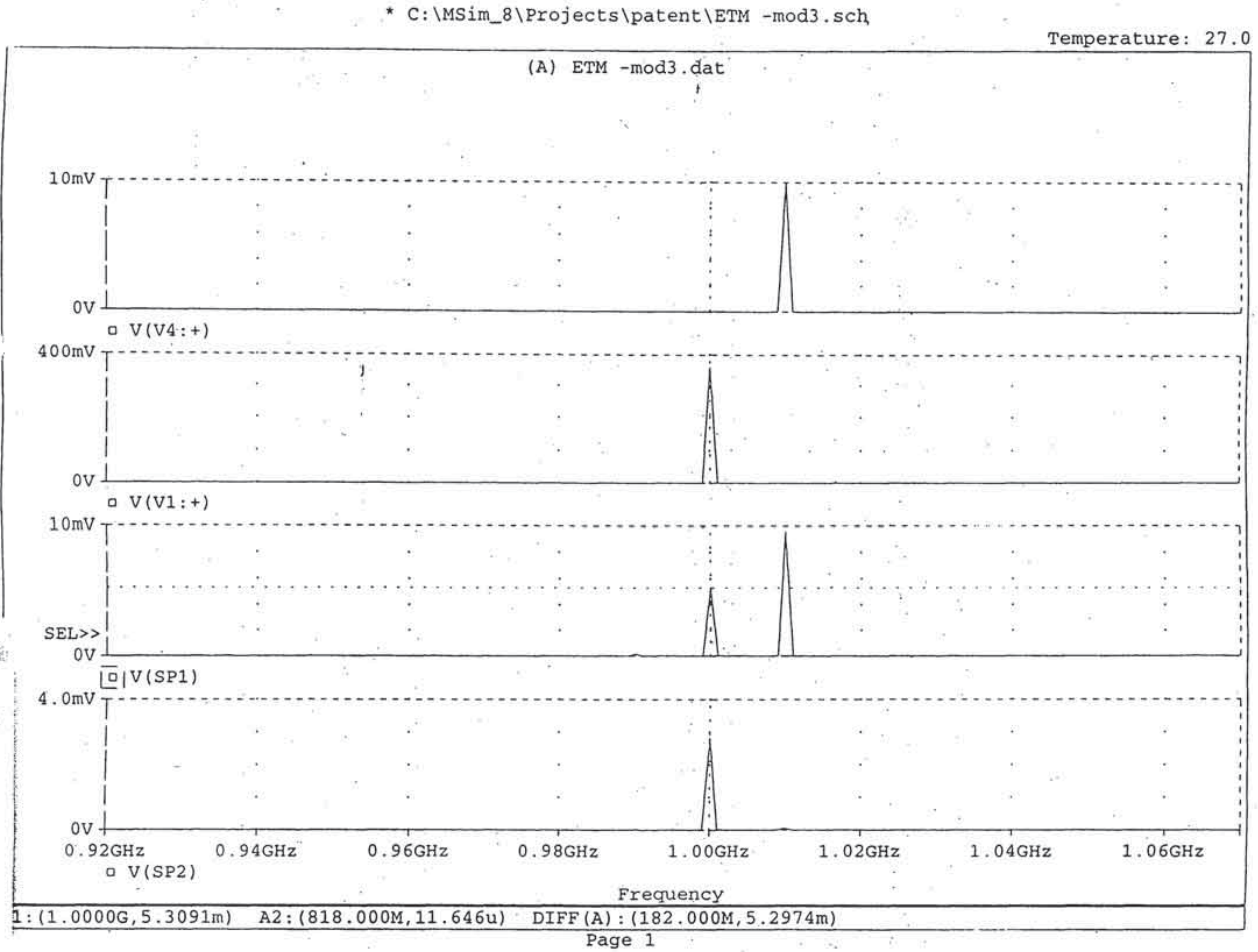


FIG 127J

FIG. 127K

FIG 127L

PRINT OF DRAWINGS AS ORIGINALLY FI

09521979.030900

823

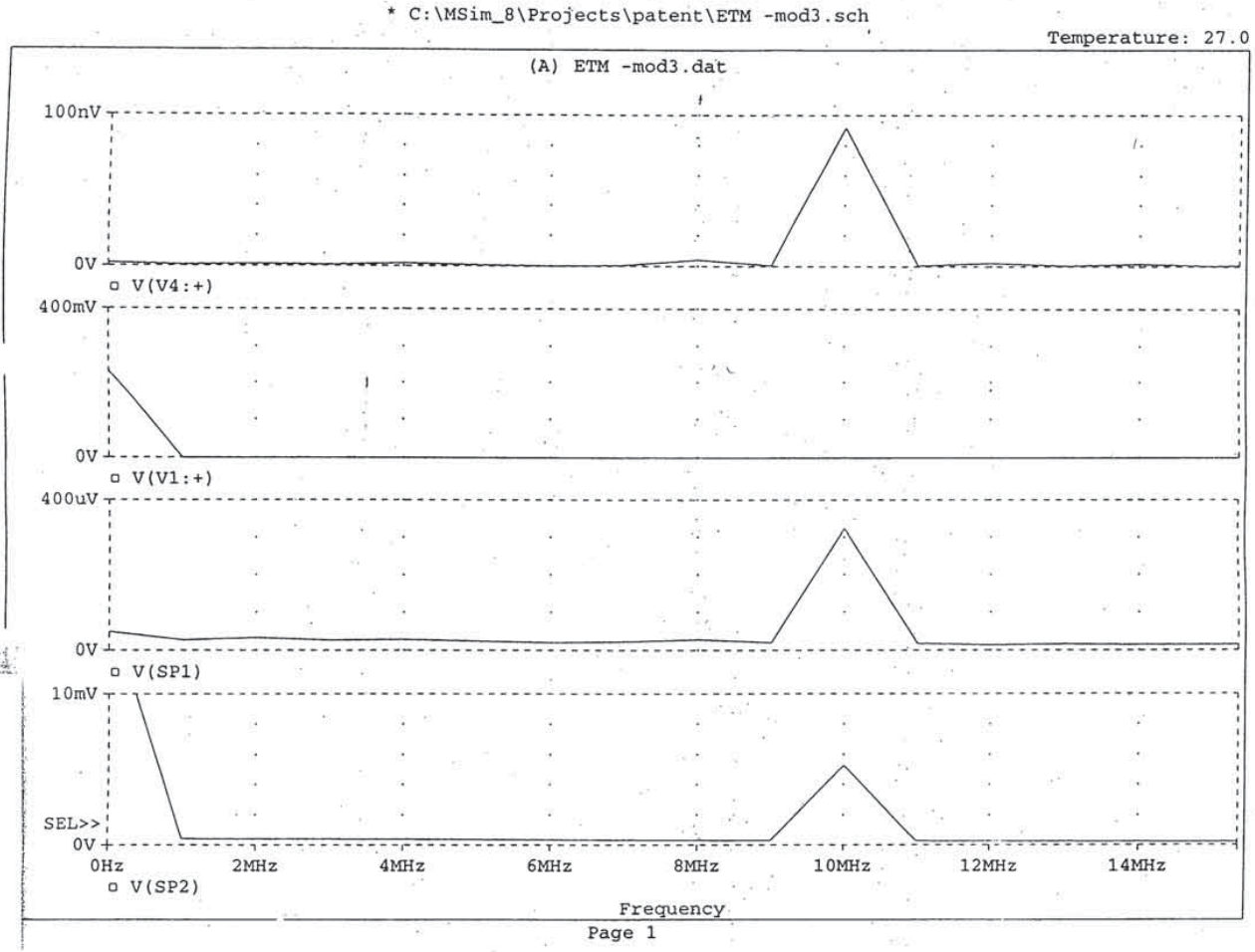


FIG. 127N

FIG. 127O

FIG. 127P

PRINT OF DRAWINGS AS ORIGINALLY FI

09521979.030900

824

PRINT OF DRAWINGS
AS ORIGINALLY FI

No. 5505
Engineer's Computation Pad

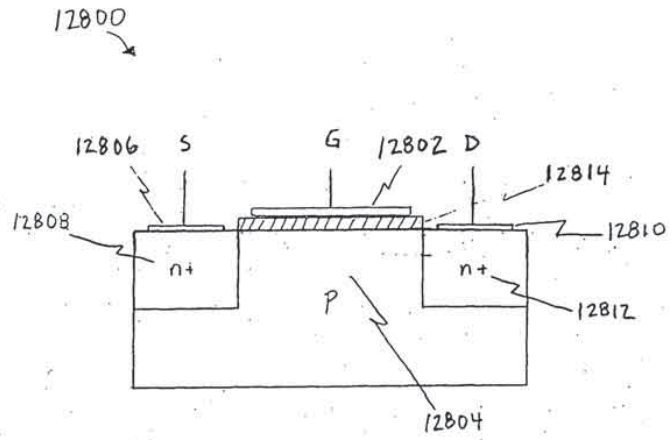


FIG. 128A

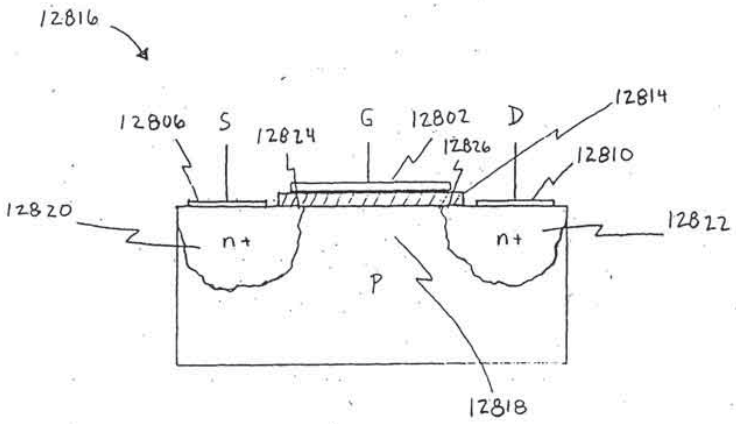


FIG. 128B

PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 12C

Engineer's Compilation Pad

PRINT OF DRAWINGS
AS ORIGINALLY FT

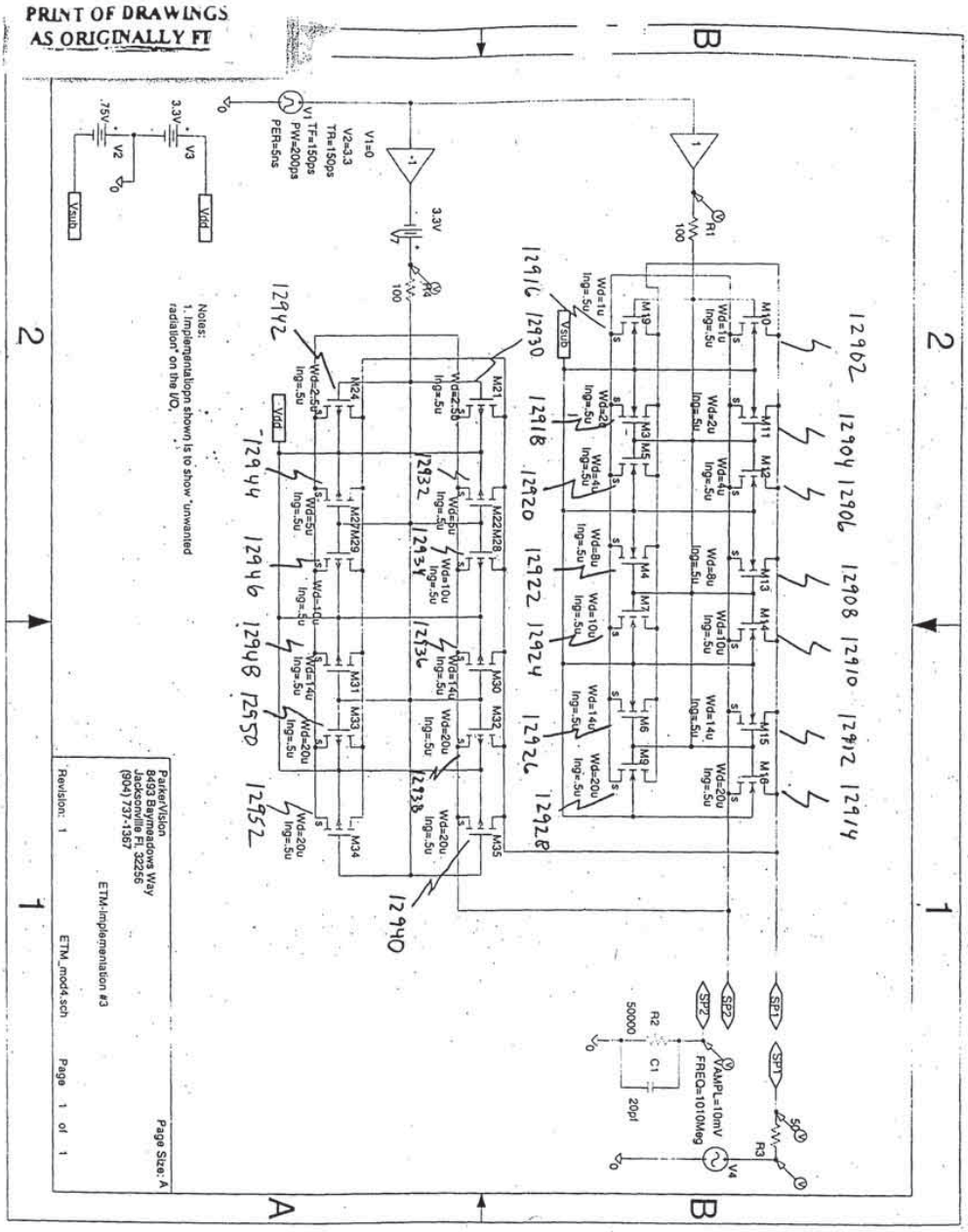


FIG. 129A

DISCLOSED

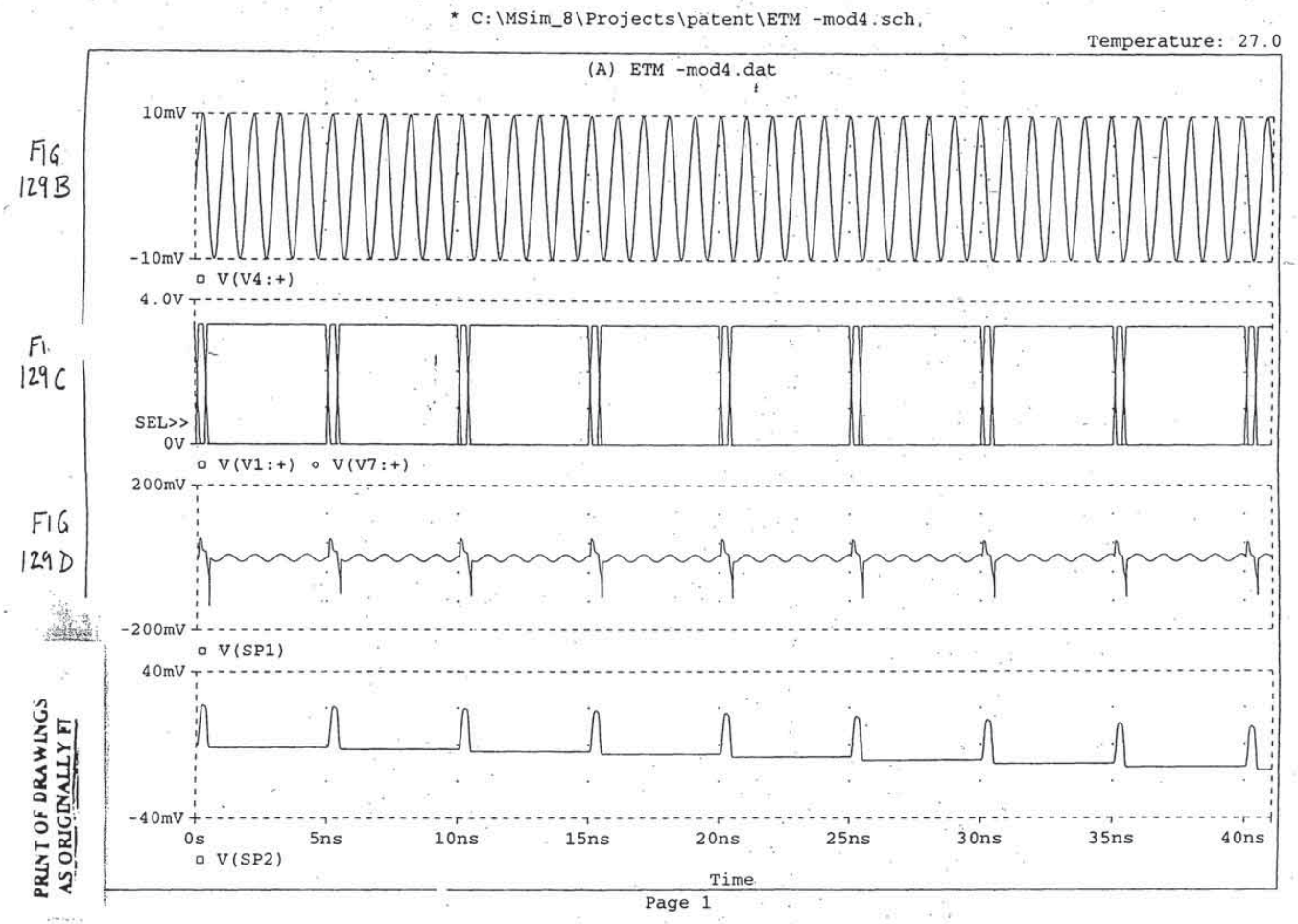


FIG 129B

FIG 129C

FIG 129D

PRINT OF DRAWINGS AS ORIGINALLY FI

828

09521873.030900

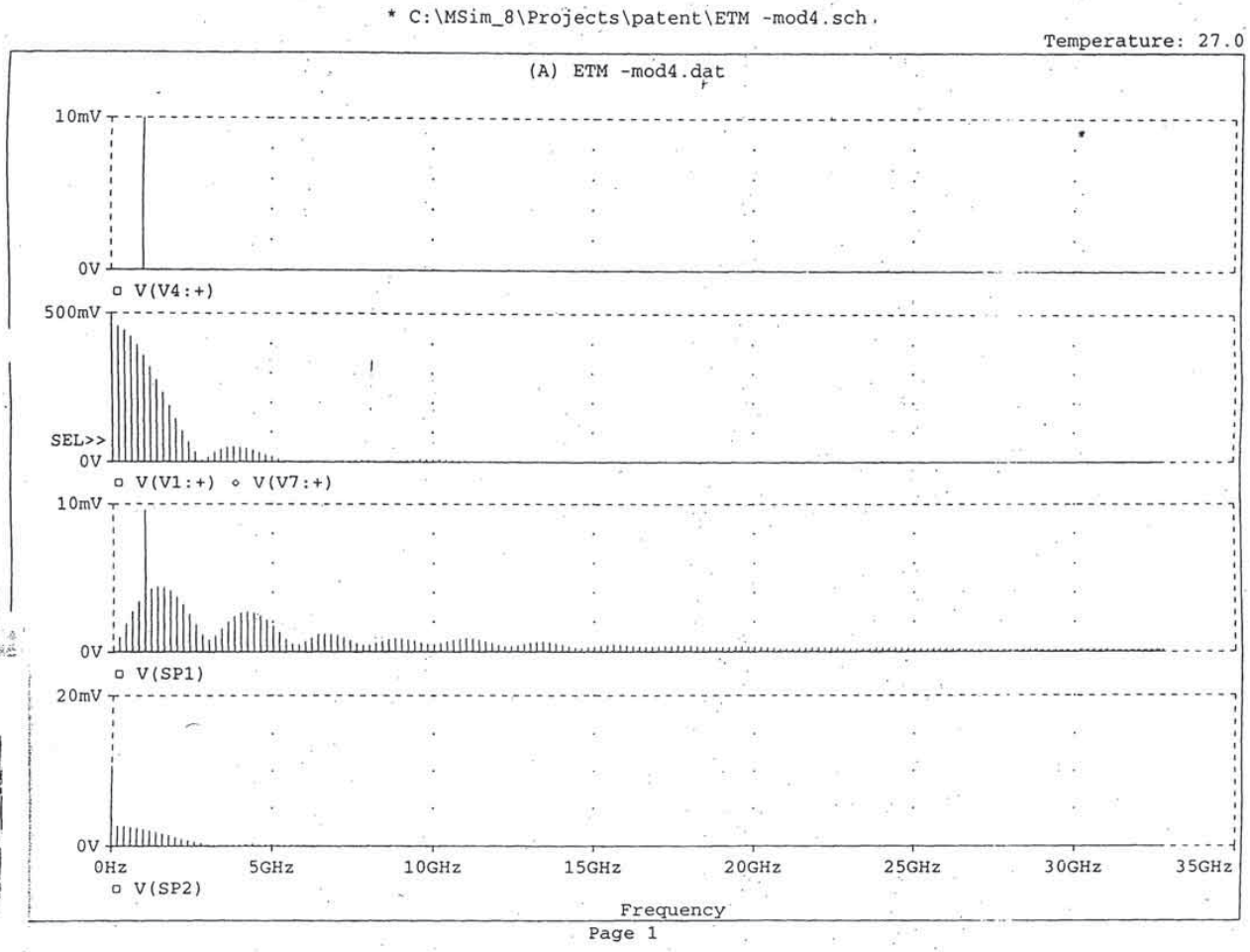


FIG 129F

FIG 129G

FIG 129H

PRINT OF DRAWINGS AS ORIGINALLY FT

09521979.030900

829

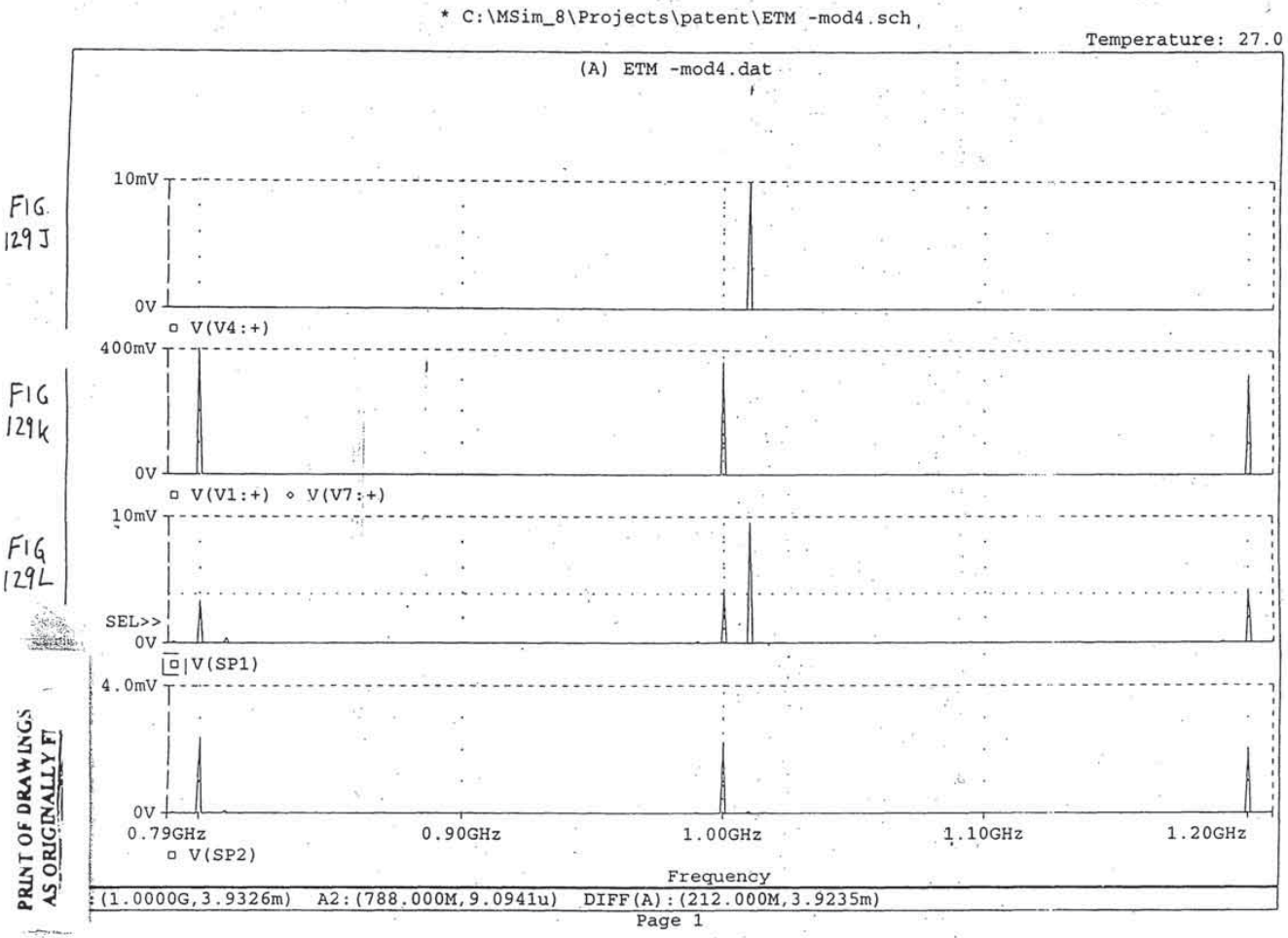


FIG 129J

FIG 129K

FIG 129L

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879.030900

830

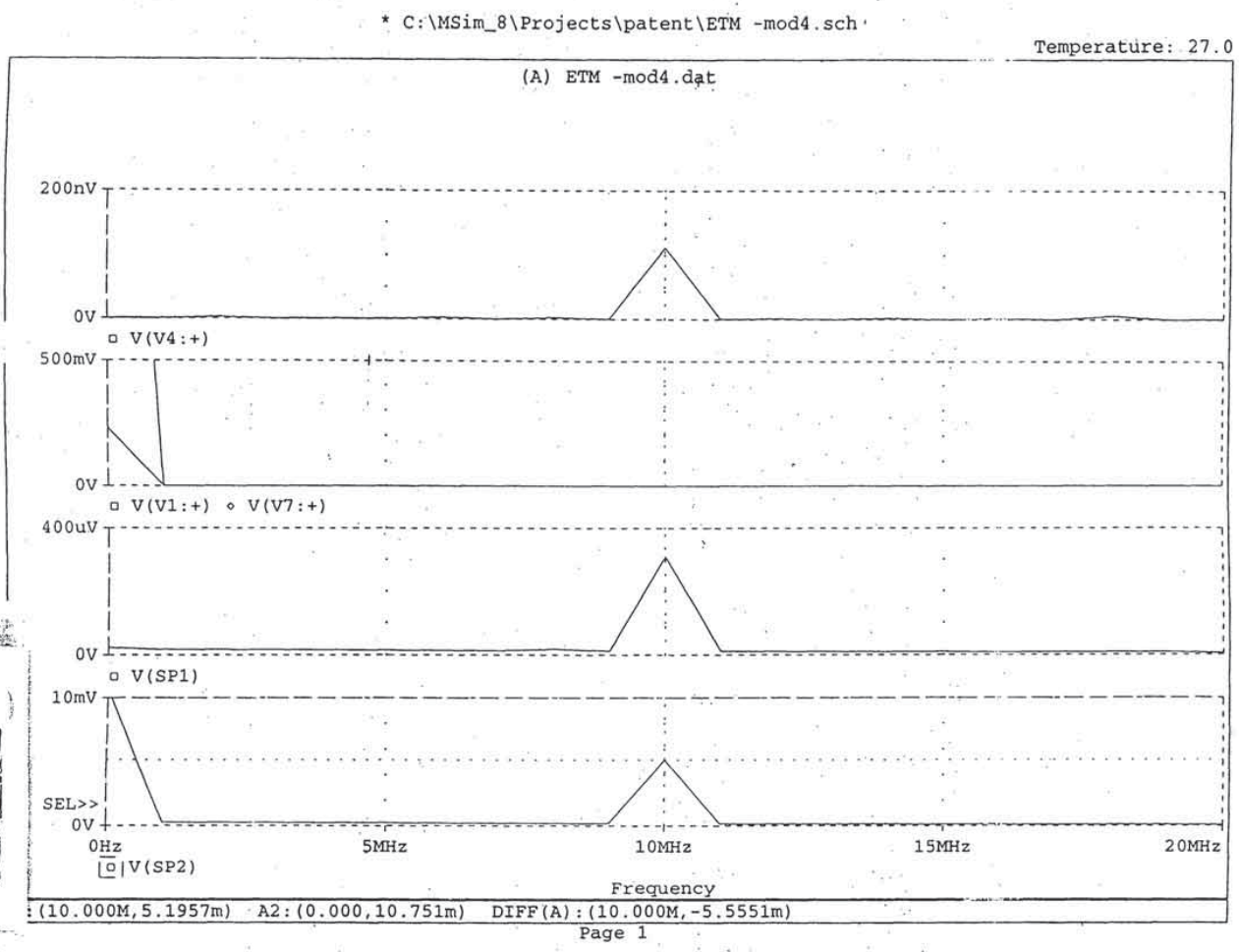


FIG 129 N

FIG 129 O

FIG

PRINT OF DRAWINGS AS ORIGINALLY F

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PRINT OF DRAWINGS
AS ORIGINALLY FI

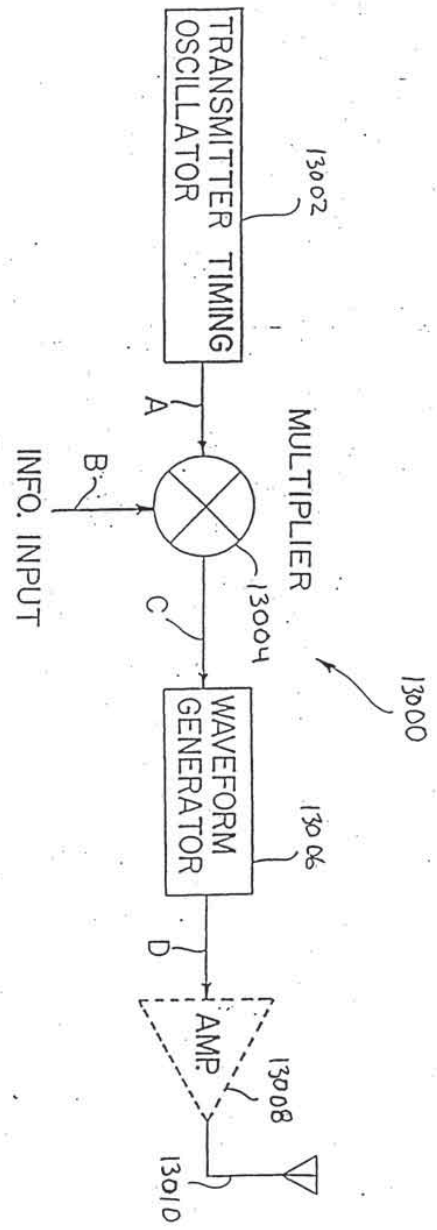


FIG. 130

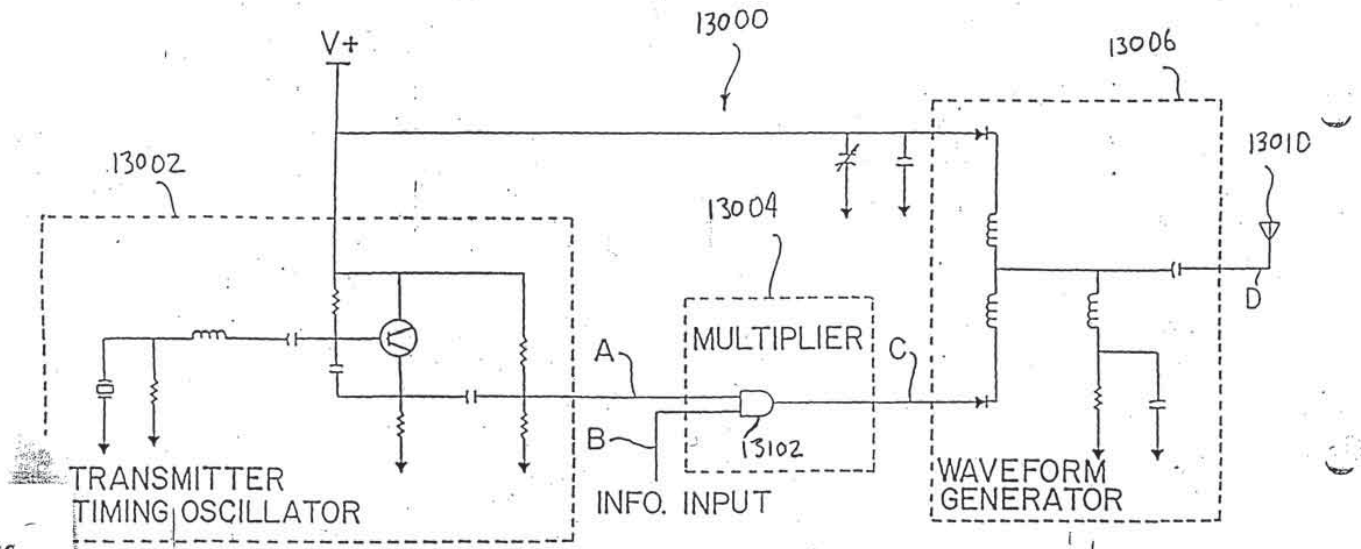


FIG. 131

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879.030900

833

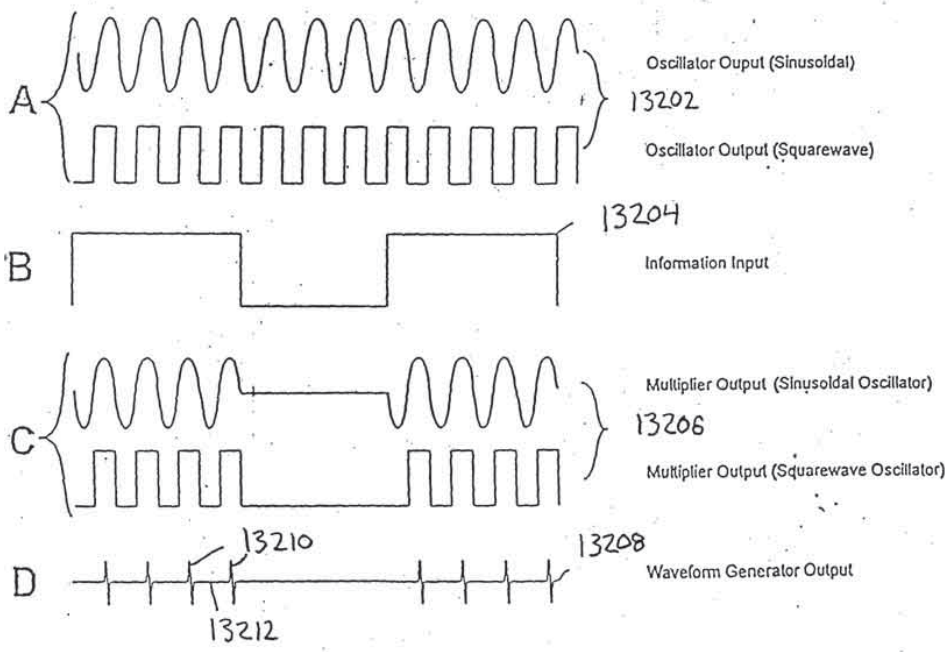


FIG. 132

PRINT OF DRAWINGS AS ORIGINALLY FI

09521879.030900

PRINT OF DRAWINGS
AS ORIGINALLY F

FIG. 133

PRINT OF DRAWINGS
AS ORIGINALLY F

FIG. 134

PRINT OF DRAWINGS
AS ORIGINALLY F

FIG. 135

PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 136

PRINT OF DRAWINGS
AS ORIGINALLY FI

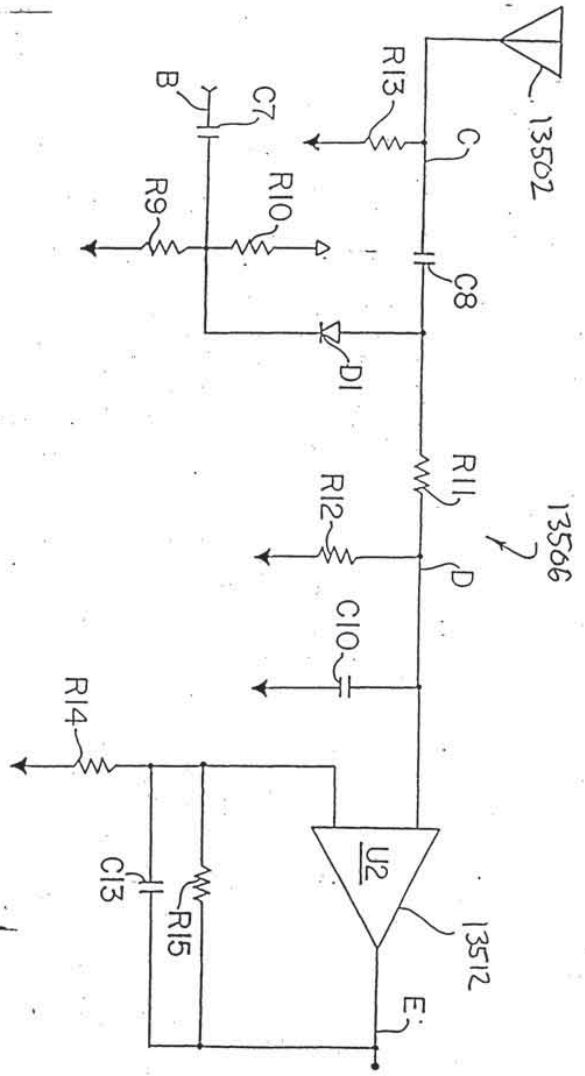


FIG. 137

PRINT OF DRAWINGS
AS ORIGINALLY F

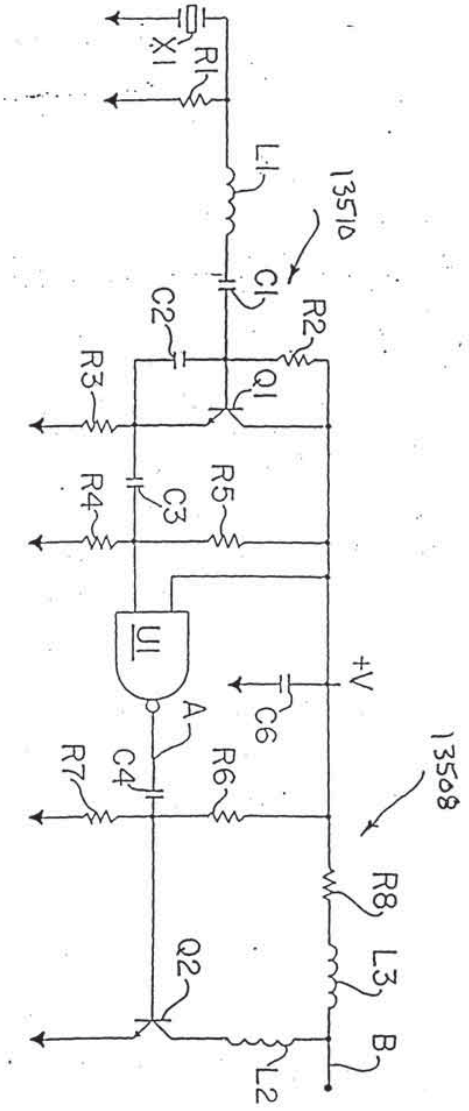


FIG. 138

PRINT OF DRAWINGS
AS ORIGINALLY F

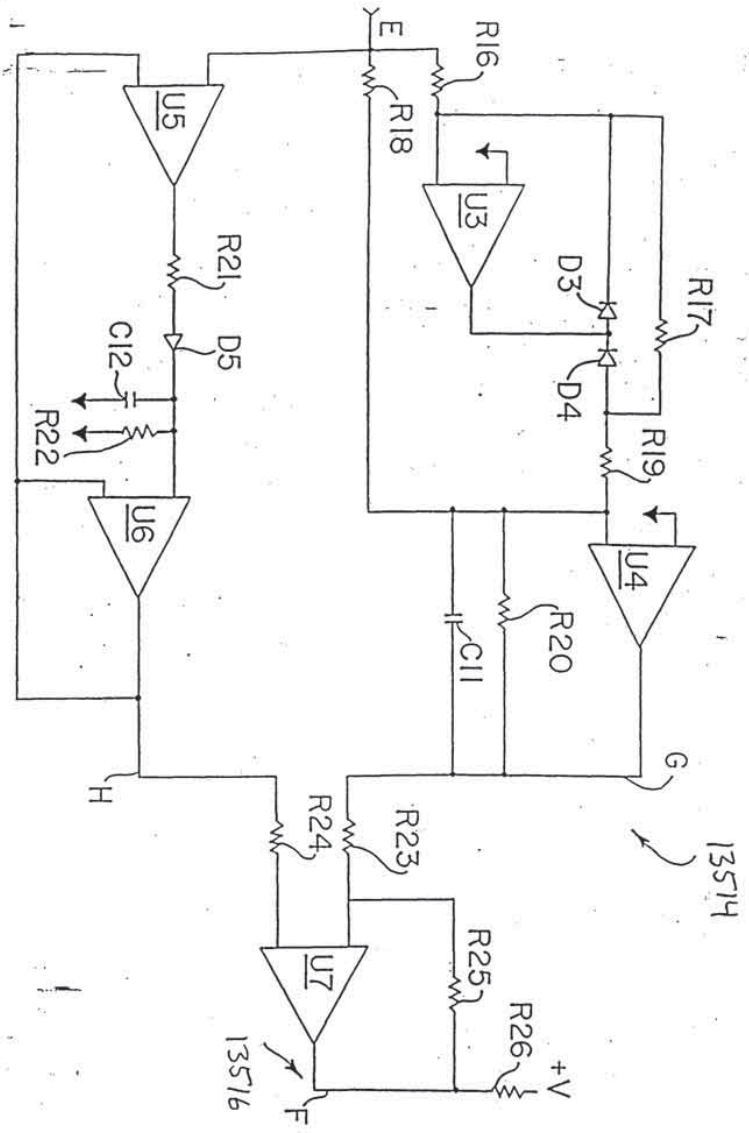


FIG. 139

PRINT OF DRAWINGS
AS ORIGINALLY FI

FIG. 14o

PRINT OF DRAWINGS
AS ORIGINALLY F

FIG. 141

0052187 - 0210000

PRINT OF DRAWINGS
AS ORIGINALLY FIL

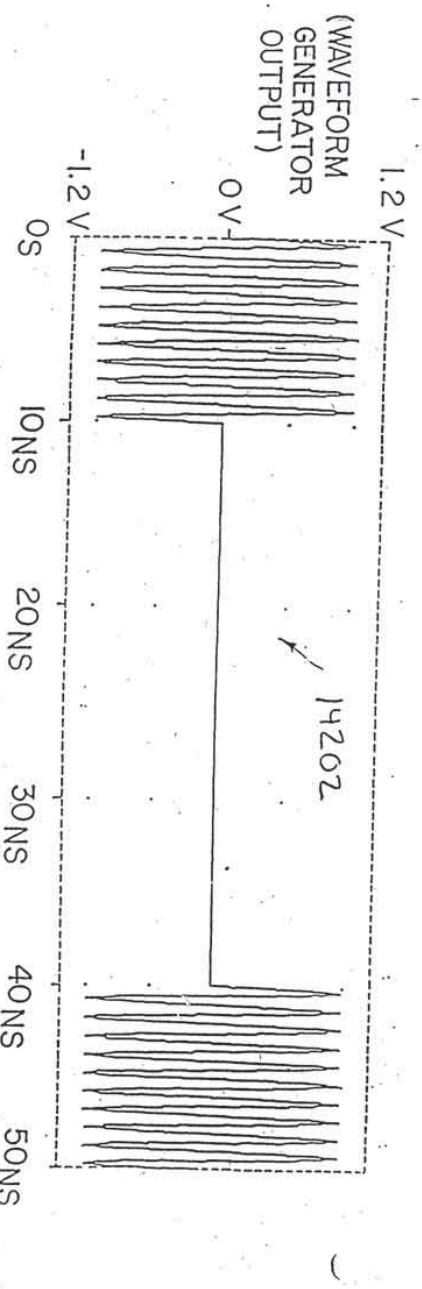


FIG. 142

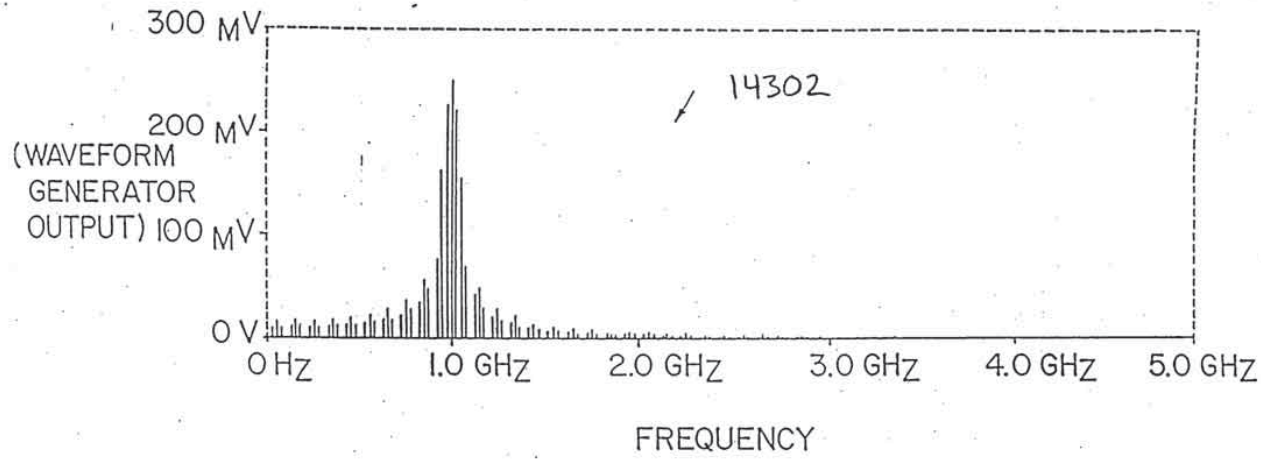


FIG. 143

PRINT OF DRAWINGS AS ORIGINALLY FII

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

RF DIFFERENTIAL RECEIVER

FIG. 144

PRINT OF DRAWINGS
AS ORIGINALLY FIL

PSEUDO DIFFERENTIAL RECEIVER

FIG. 145

PRINT OF DRAWINGS
AS ORIGINALLY FIL

NARROW BAND/CONSTANT CARRIER

FIG. 146

PRINT OF DRAWINGS
AS ORIGINALLY FIL
1.0 V
(WAVEFORM
GENERATOR
OUTPUT)
0.5 V
0 V
0 HZ
1.0 GHZ
2.0 GHZ
3.0 GHZ
4.0 GHZ
5.0 GHZ
FREQUENCY
NARROW BAND/CONSTANT CARRIER

FIG. 14-7

PRINT OF DRAWINGS
AS ORIGINALLY FIL

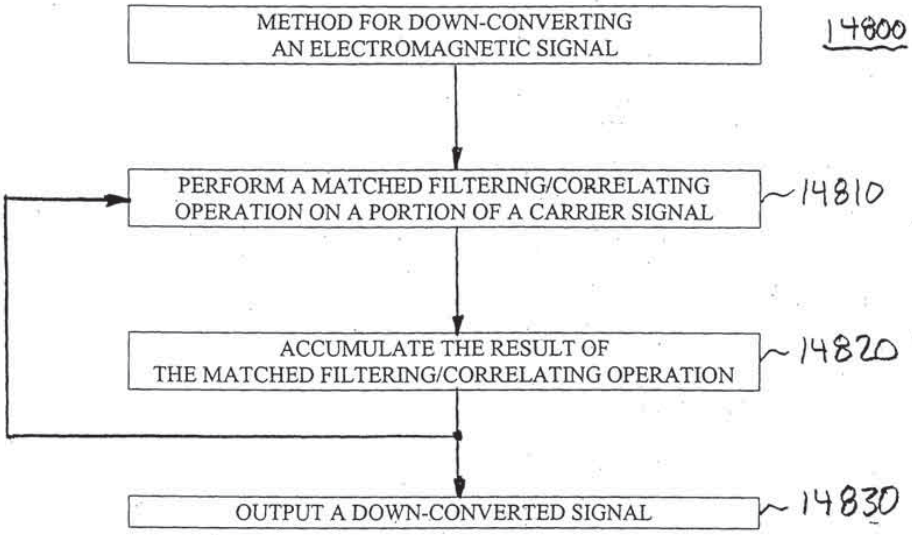


FIG. 148

PRINT OF DRAWINGS
AS ORIGINALLY FILED

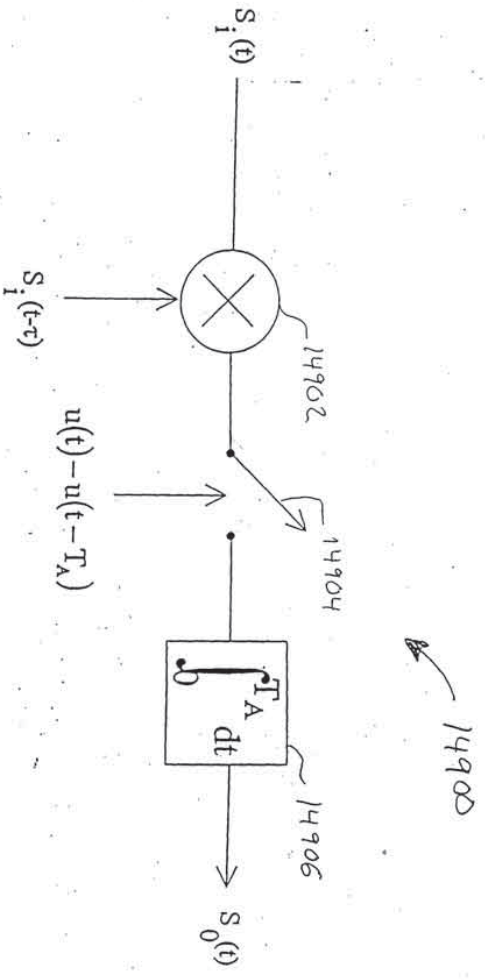


FIG. 149

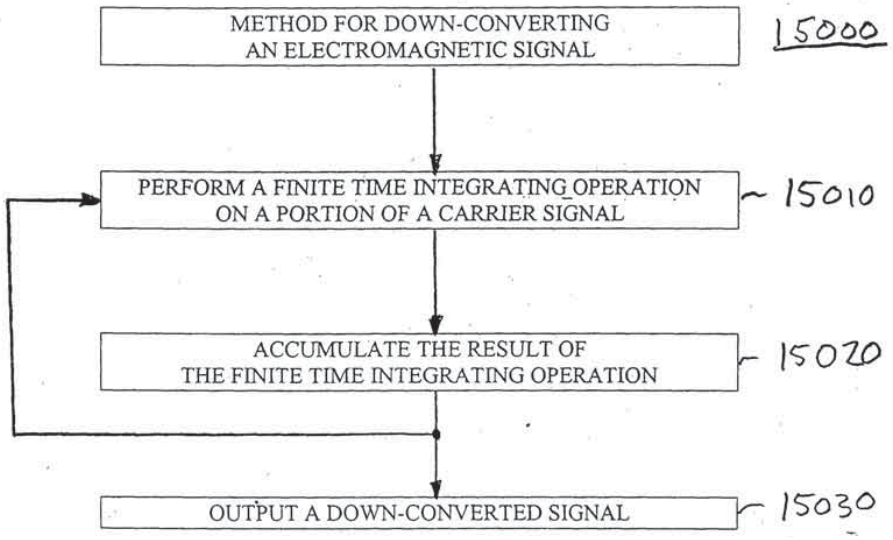

METHOD FOR DOWN-CONVERTING AN ELECTROMAGNETIC SIGNAL
15000
PERFORM A FINITE TIME INTEGRATING OPERATION ON A PORTION OF A CARRIER SIGNAL
15010
ACCUMULATE THE RESULT OF THE FINITE TIME INTEGRATING OPERATION
15020
OUTPUT A DOWN-CONVERTED SIGNAL
15030

FIG. 150

PRINT OF DRAWINGS
AS ORIGINALLY FIL

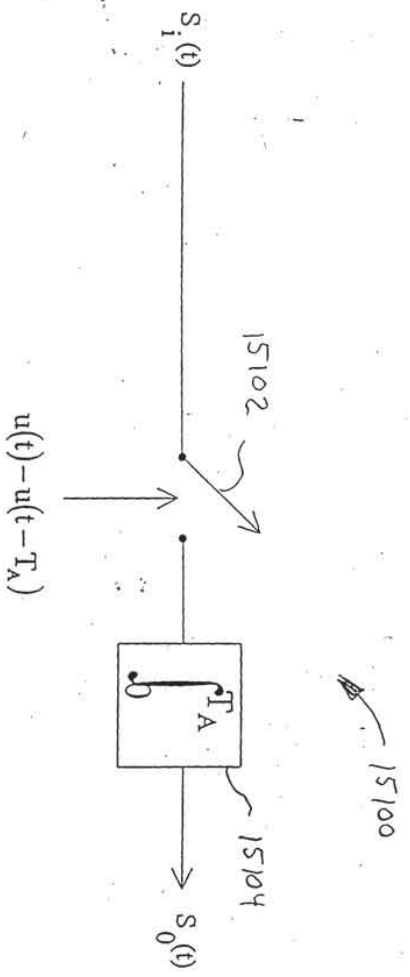


FIG. 151

PRINT OF DRAWINGS
AS ORIGINALLY FII

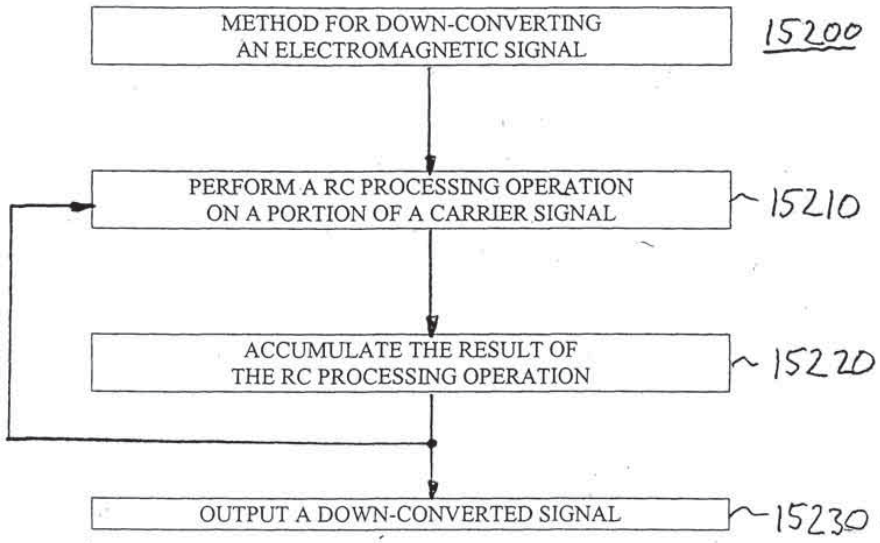


FIG. 152

PRINT OF DRAWINGS
AS ORIGINALLY FIL.

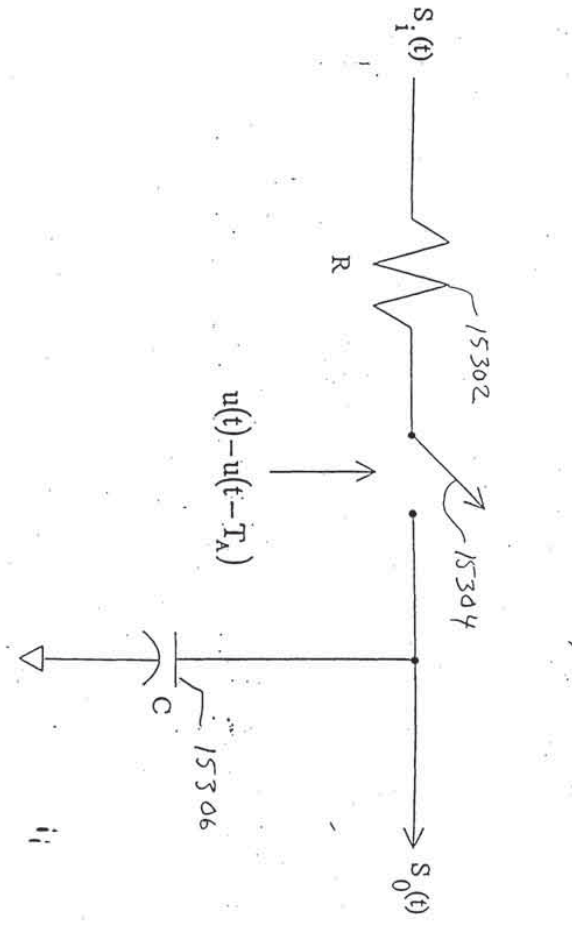


FIG. 153

PRINT OF DRAWINGS
AS ORIGINALLY FIL

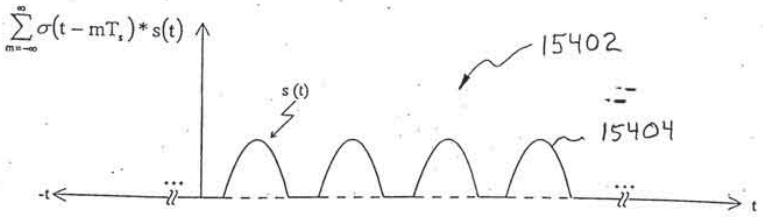


FIG. 154

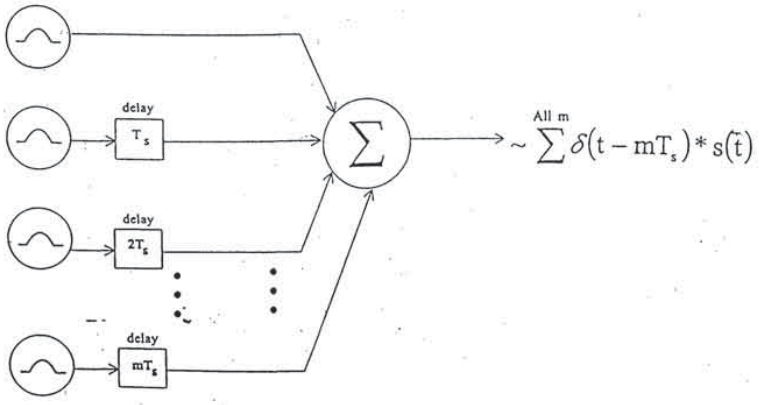


FIG. 155

PRINT OF DRAWINGS
AS ORIGINALLY FIL

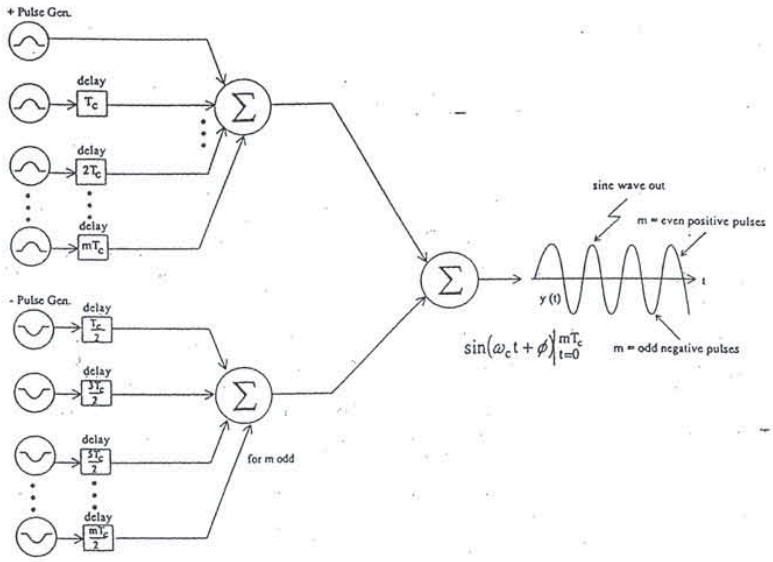
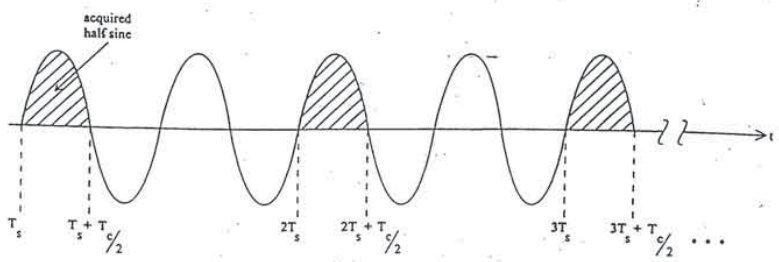


FIG. 156

PRINT OF DRAWINGS
AS ORIGINALLY FIL



Carrier Processed by 3rd Harmonic UFT Processor

FIG. 157

PRINT OF DRAWINGS
AS ORIGINALLY FIL

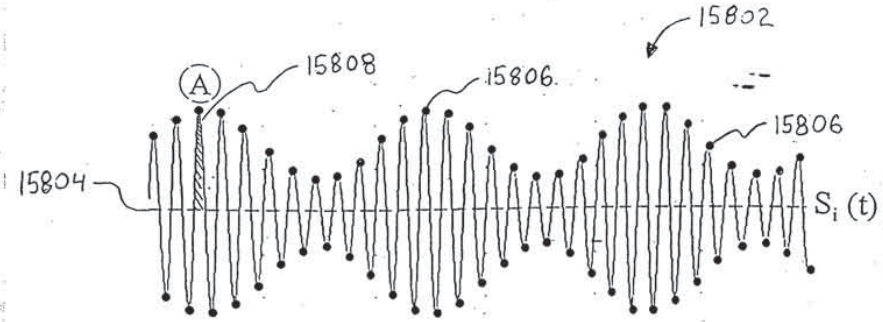


FIG. 158

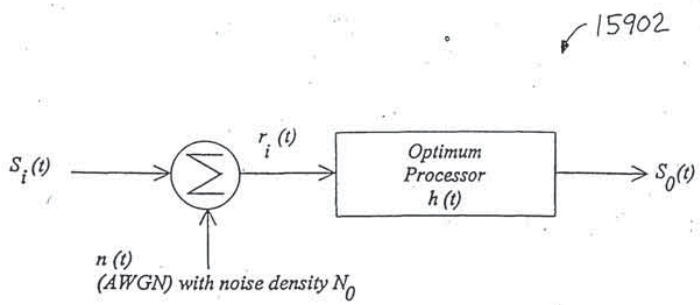


FIG. 159

PRINT OF DRAWINGS
AS ORIGINALLY FIL

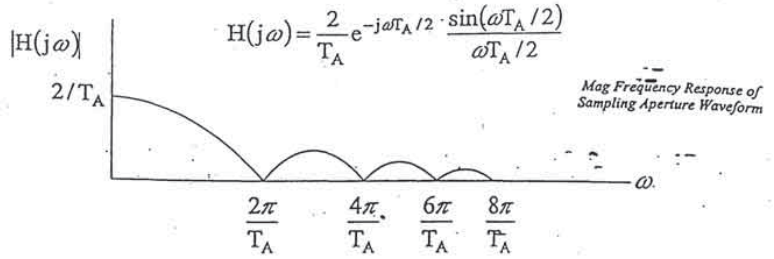
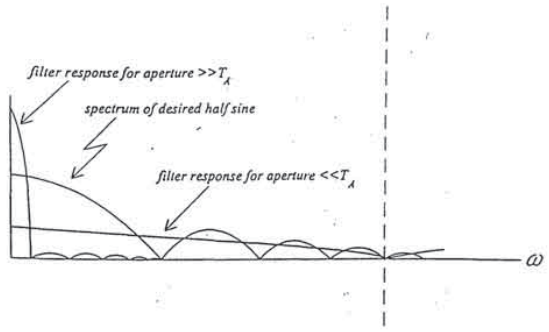


FIG. 160



Aperture Frequency Domain Representation

FIG. 161

ADOBE ID: 8615908

PRINT OF DRAWINGS
AS ORIGINALLY FIL

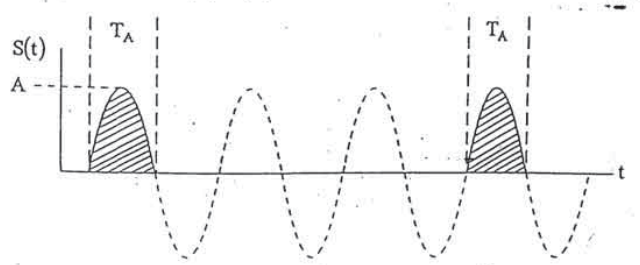


FIG. 162

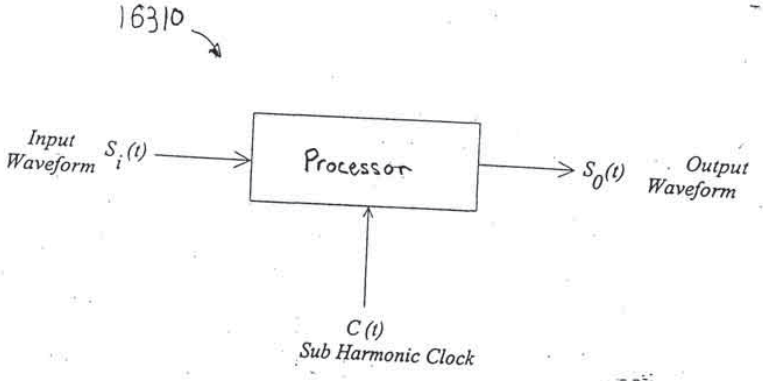


FIG. 163

PRINT OF DRAWINGS
AS ORIGINALLY FIL

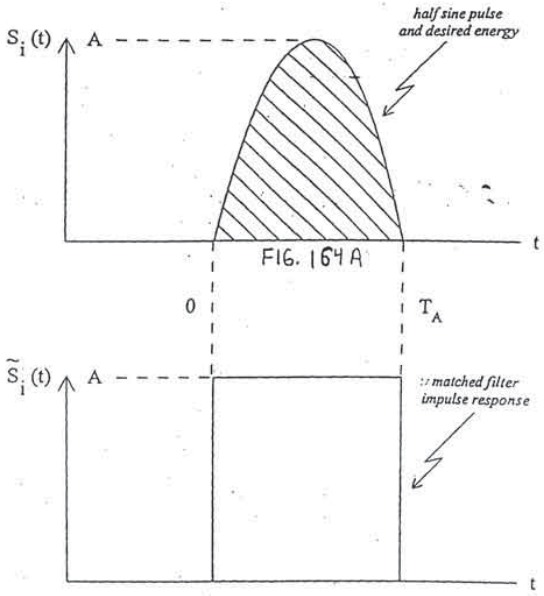


FIG. 164A

FIG. 164B

PRINT OF DRAWINGS
AS ORIGINALLY FIL

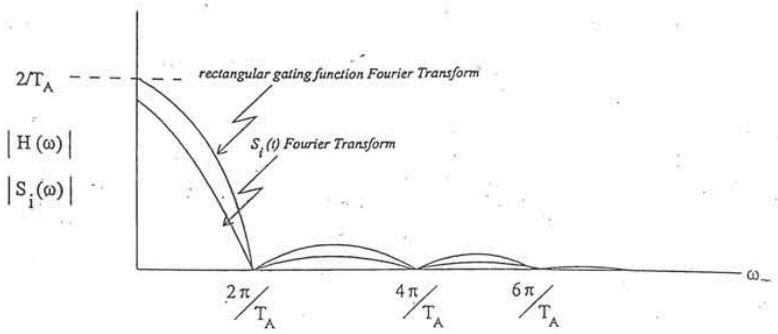


FIG. 164C

PRINT OF DRAWINGS
AS ORIGINALLY FILED

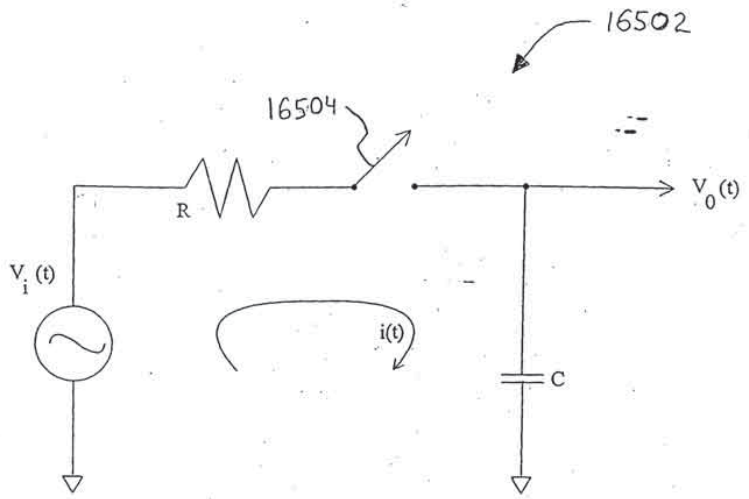


FIG. 165

PRINT OF DRAWINGS
AS ORIGINALLY FIL

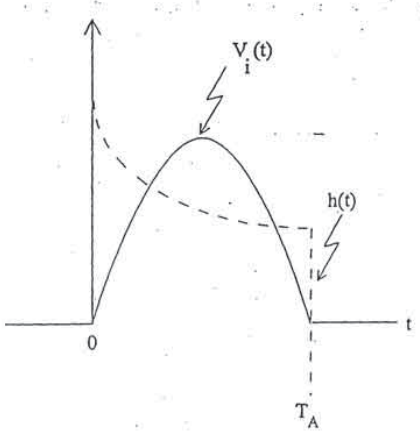


FIG. 166

PRINT OF DRAWINGS
AS ORIGINALLY FIL

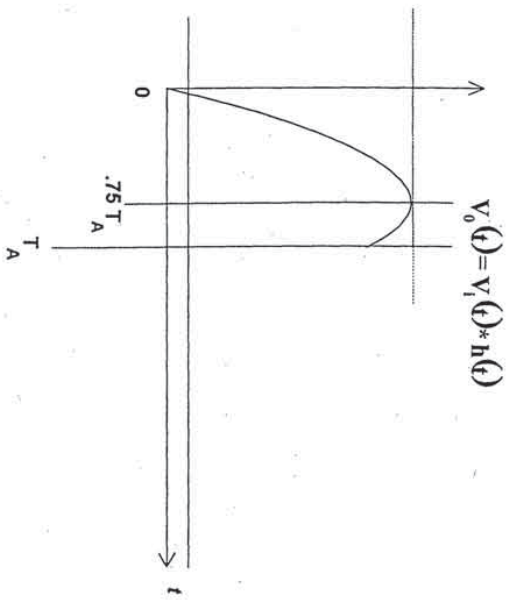


FIG. 16?

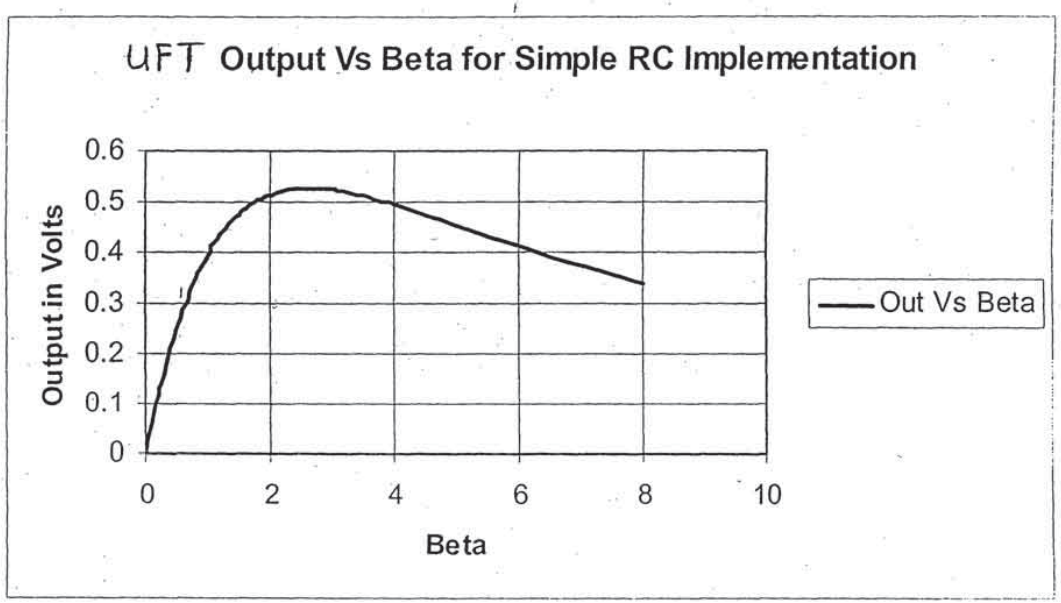


FIG. 168

PRINT OF DRAWINGS
AS ORIGINALLY FIL

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

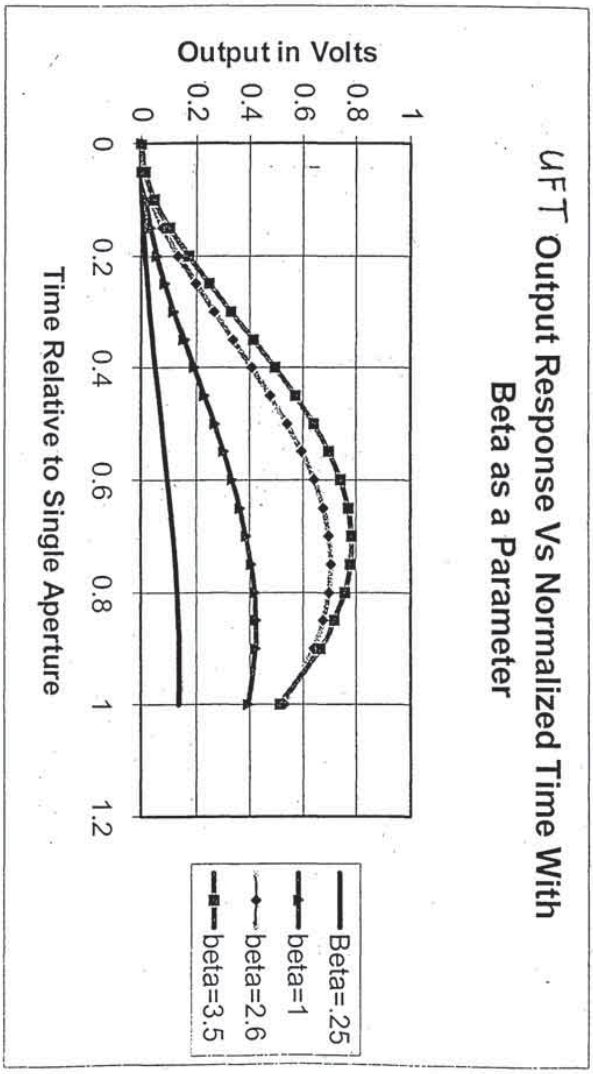


FIG. 169

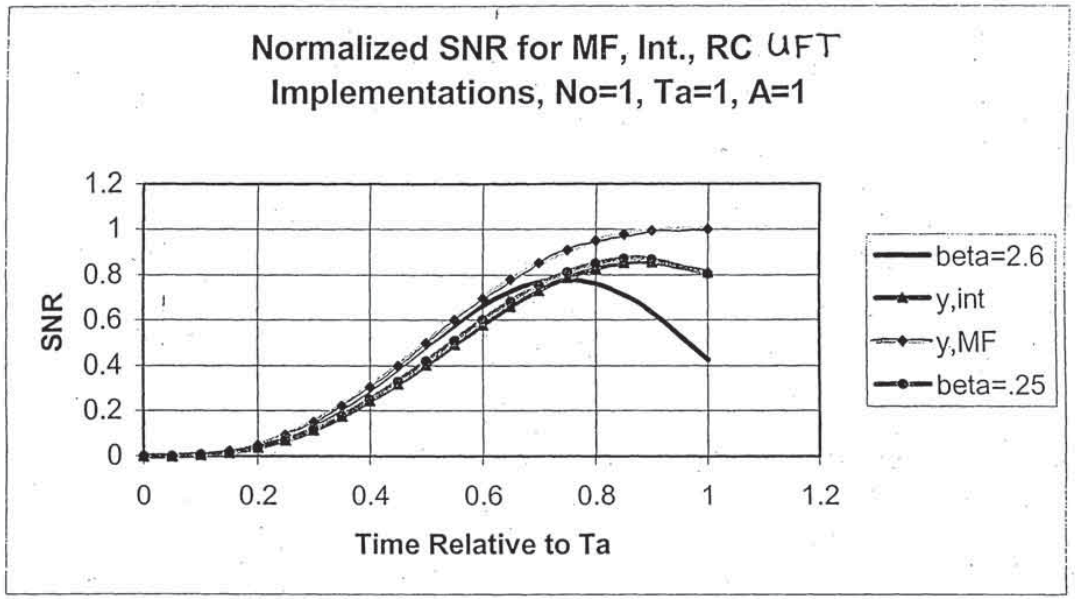


FIG. 170

PRINT OF DRAWINGS
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09521979.030900

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 17

PRINT OF DRAWINGS
AS ORIGINALLY FIL

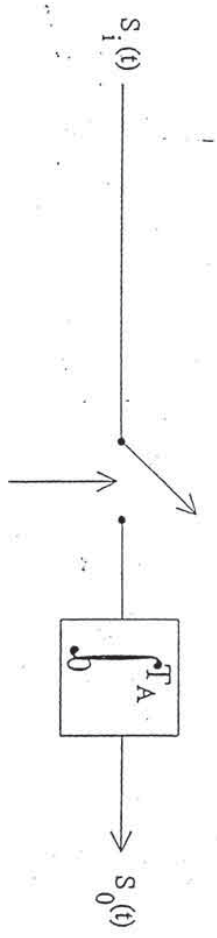


FIG. 172

PRINT OF DRAWINGS
AS ORIGINALLY FIL

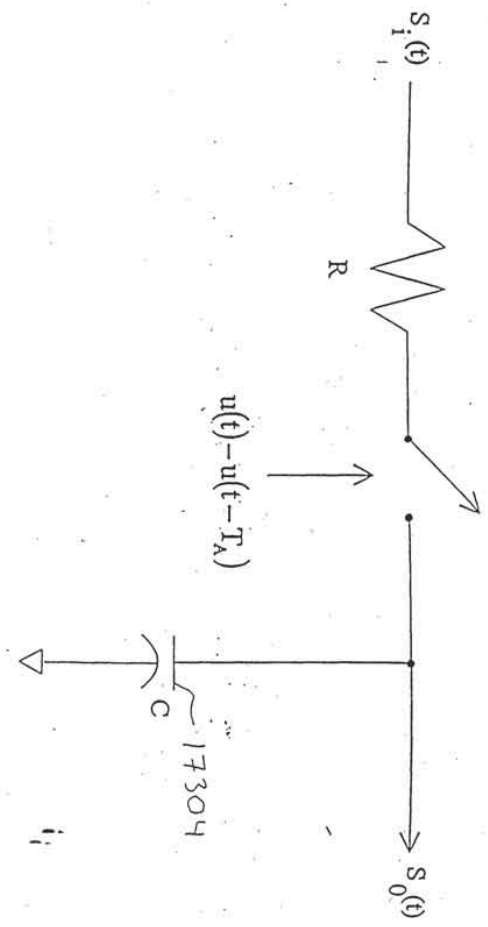


FIG. 173

PRINT OF DRAWINGS
AS ORIGINALLY FIL

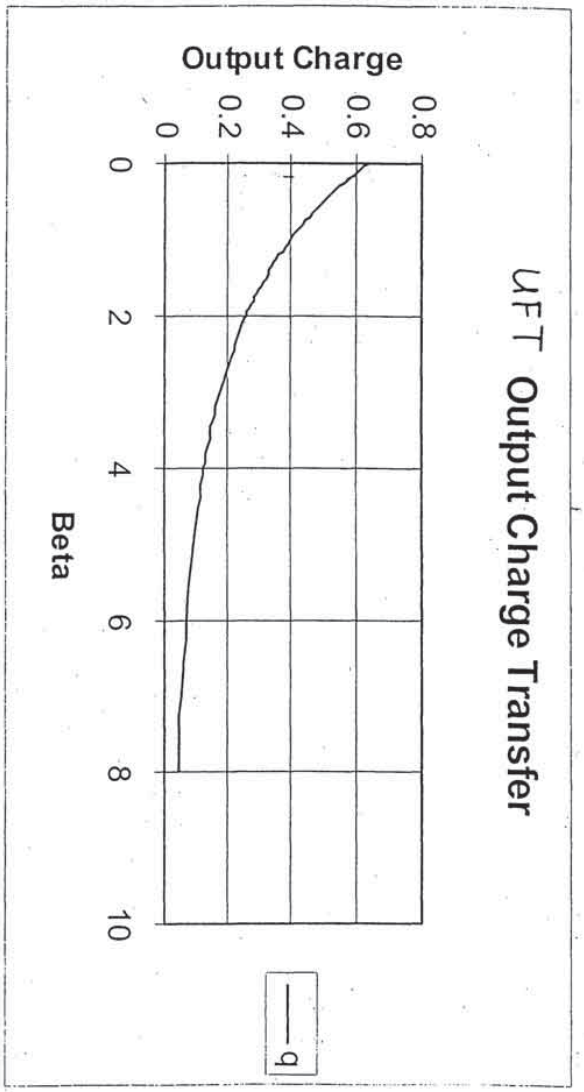


FIG. 17A

PRINT OF DRAWINGS
AS ORIGINALLY FILED

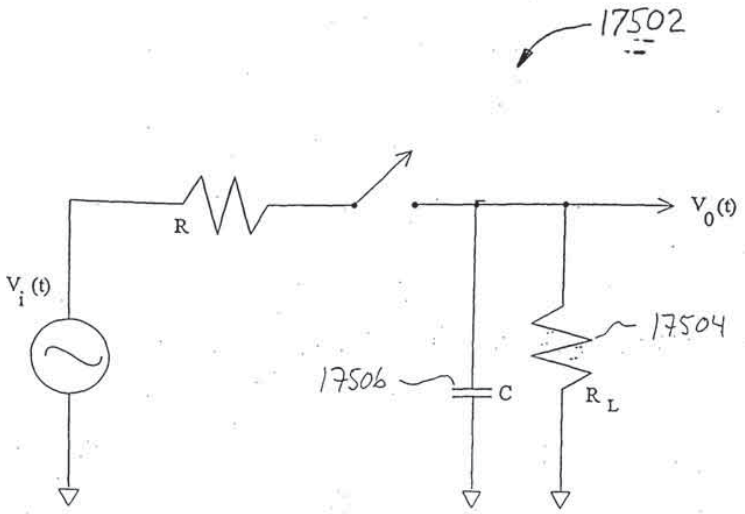


FIG. 175

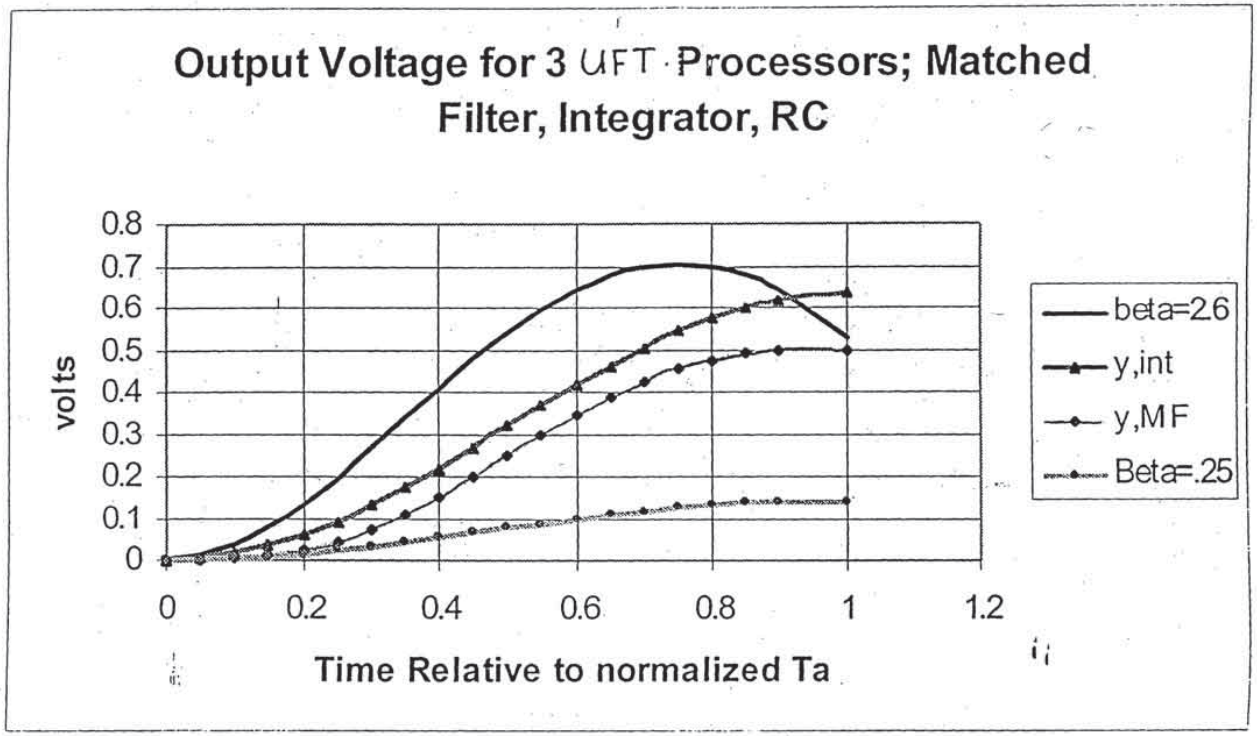


FIG. 176

PRINT OF DRAWINGS AS ORIGINALLY FII

09521979.030900

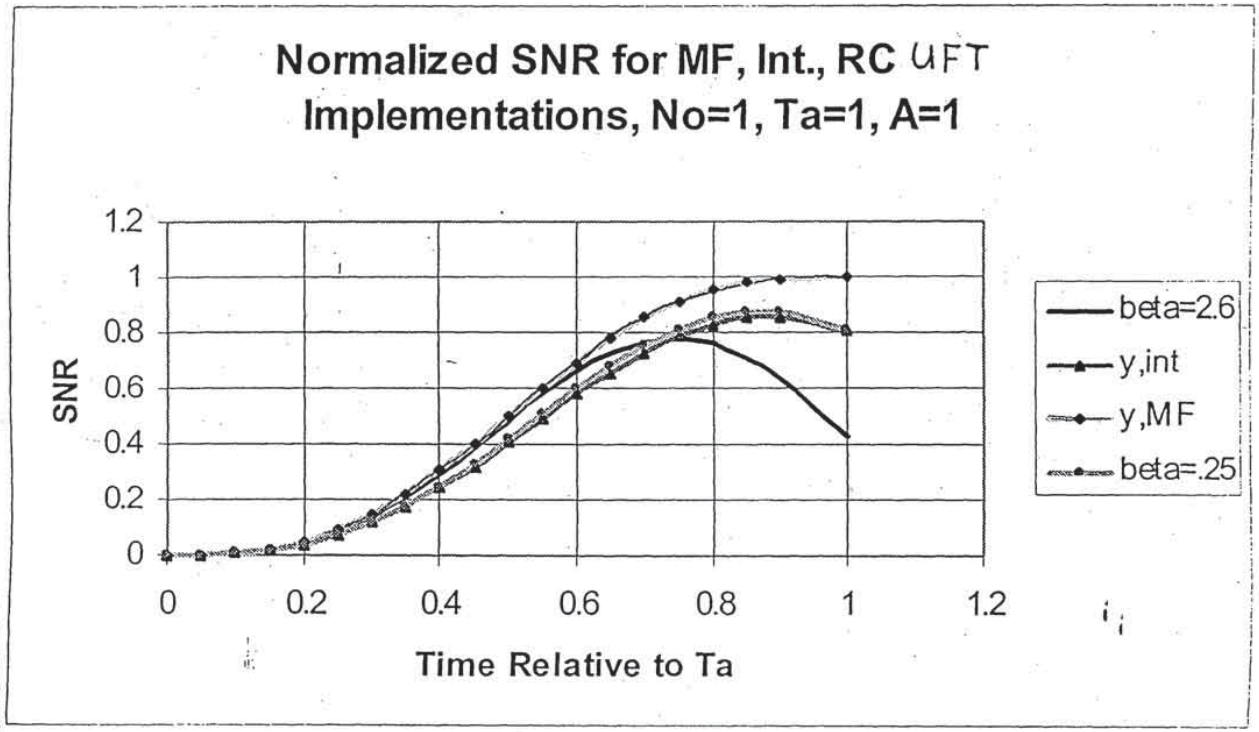


FIG. 177

PRINT OF DRAWINGS
AS ORIGINALLY FIL

09521879.030900

PRINT OF DRAWINGS
AS ORIGINALLY FIL

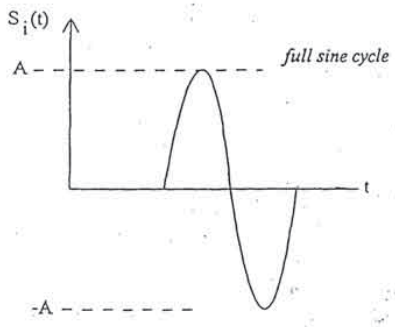


FIG. 178A

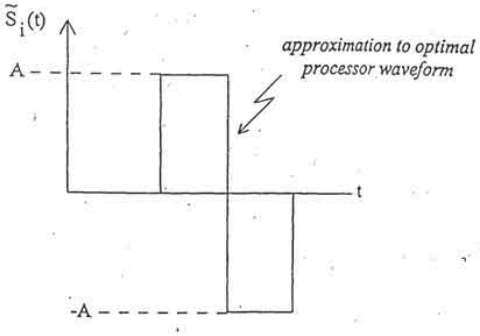


FIG. 178B

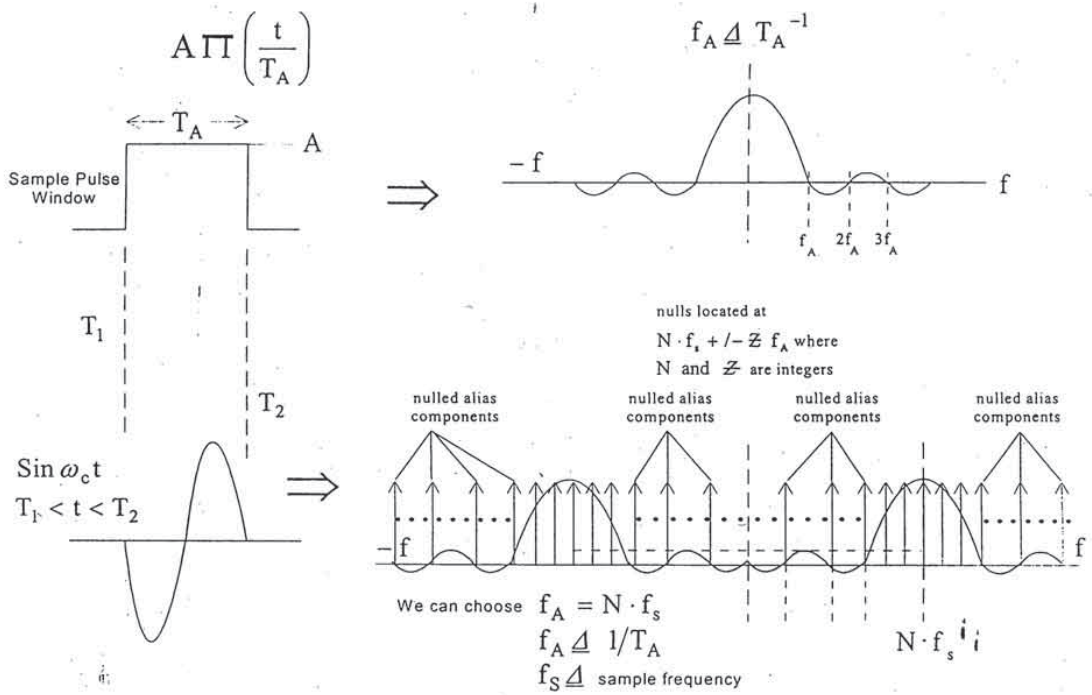


FIG. 179

PRINT OF DRAWINGS AS ORIGINALLY FILED

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PRINT OF DRAWINGS
AS ORIGINALLY FILED

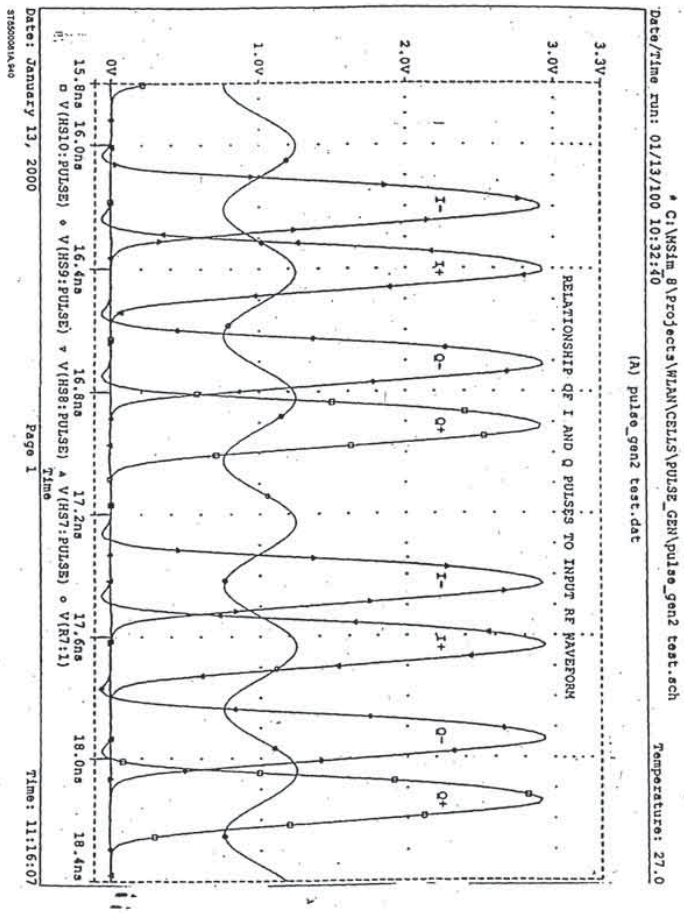


FIG. 18O

PRINT OF DRAWINGS
AS ORIGINALLY FIL

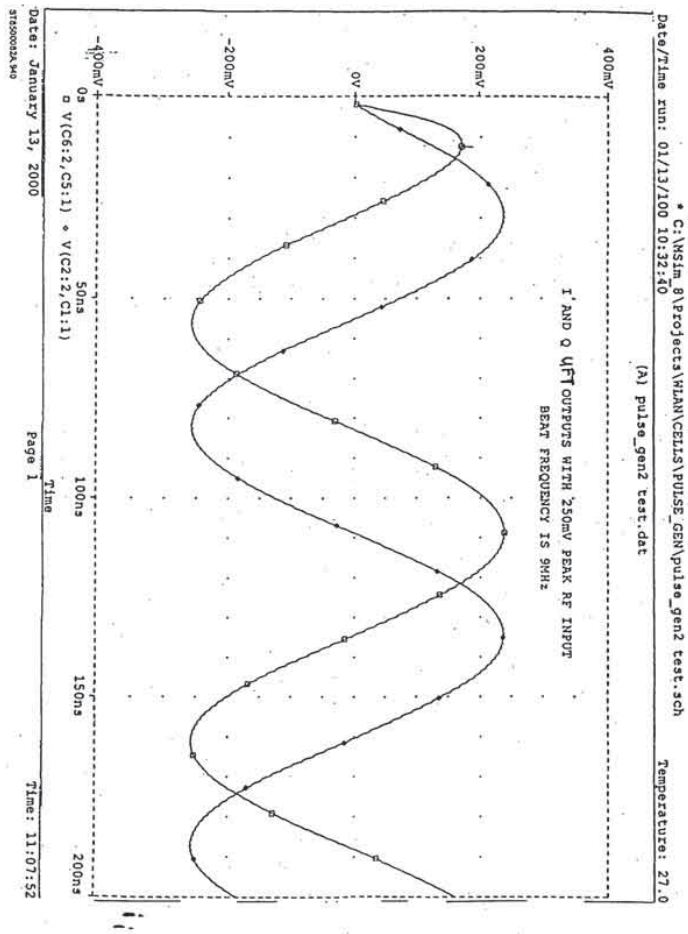


FIG. 181

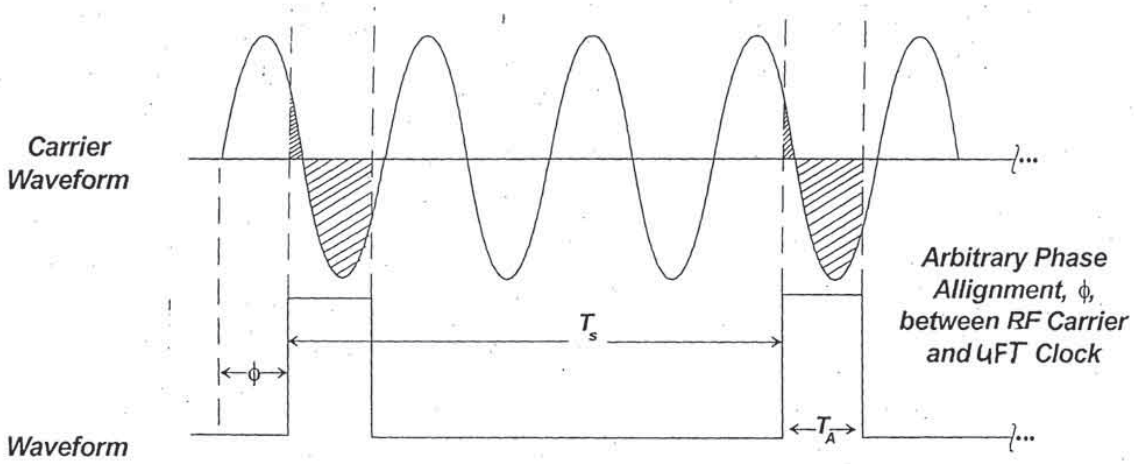


FIG. 182

PRINT OF DRAWINGS
AS ORIGINALLY FILED

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

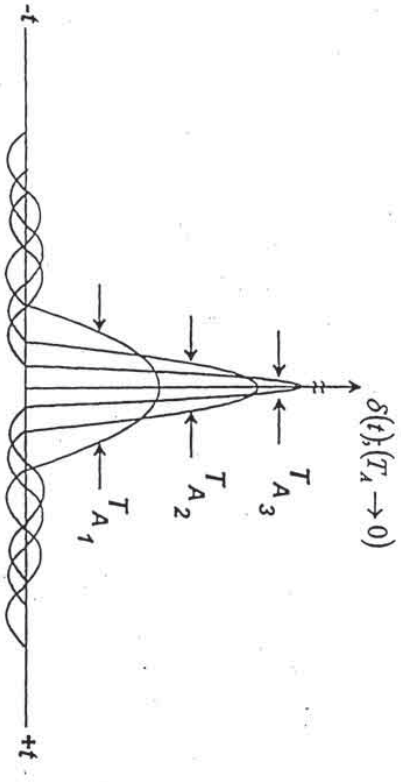


FIG. 183

PRINT OF DRAWINGS
AS ORIGINALLY FIL

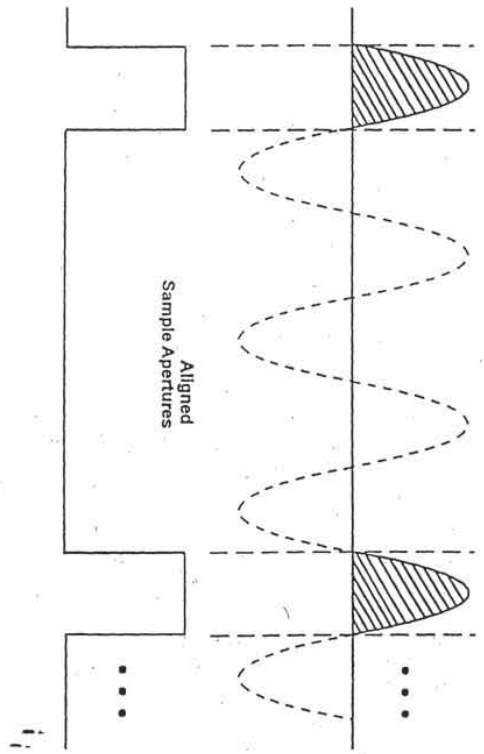


FIG. 184

PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 185

PRINT OF DRAWINGS
AS ORIGINALLY FILED

FIG. 186

PRINT OF DRAWINGS
AS ORIGINALLY FIL

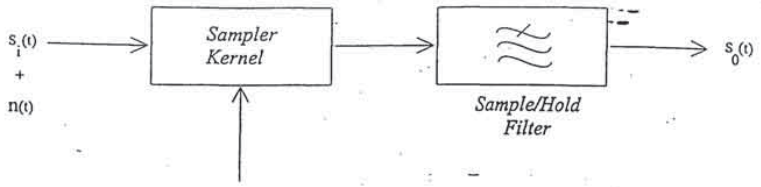


FIG. 187

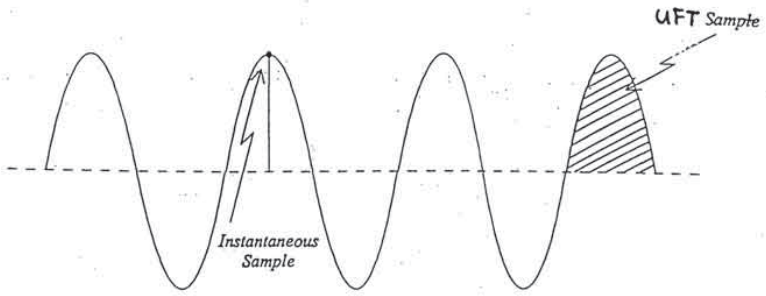


FIG. 188

PRINT OF DRAWINGS
AS ORIGINALLY FILED

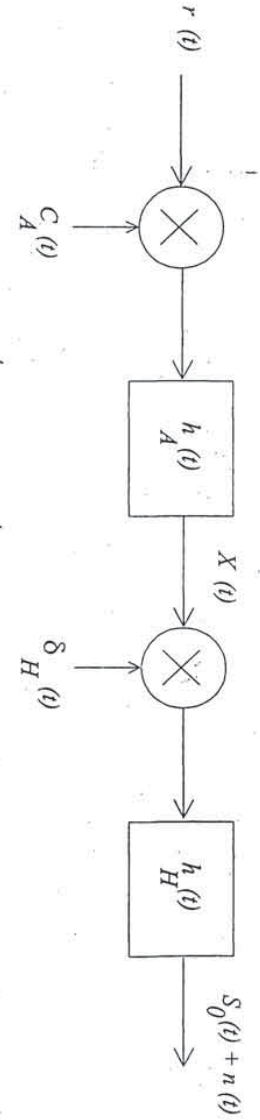


FIG. 189

PRINT OF DRAWINGS
AS ORIGINALLY FILED

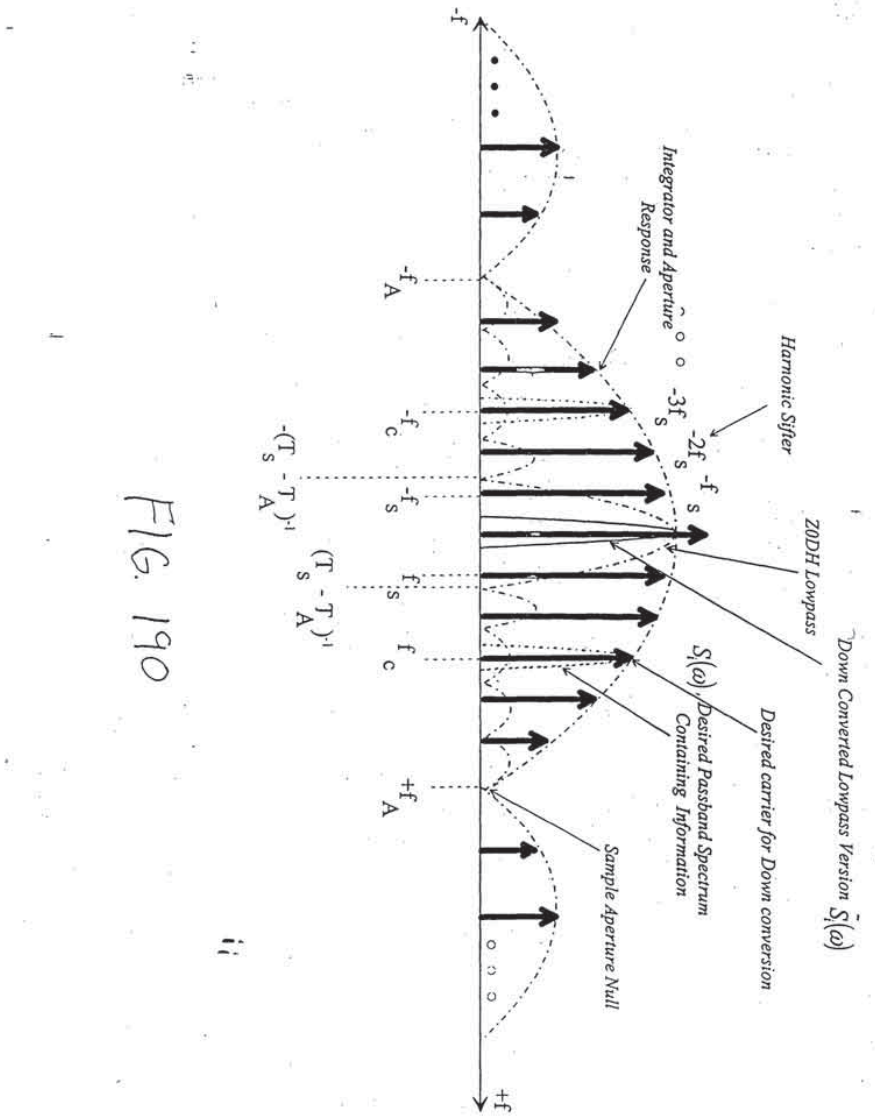


FIG. 19O

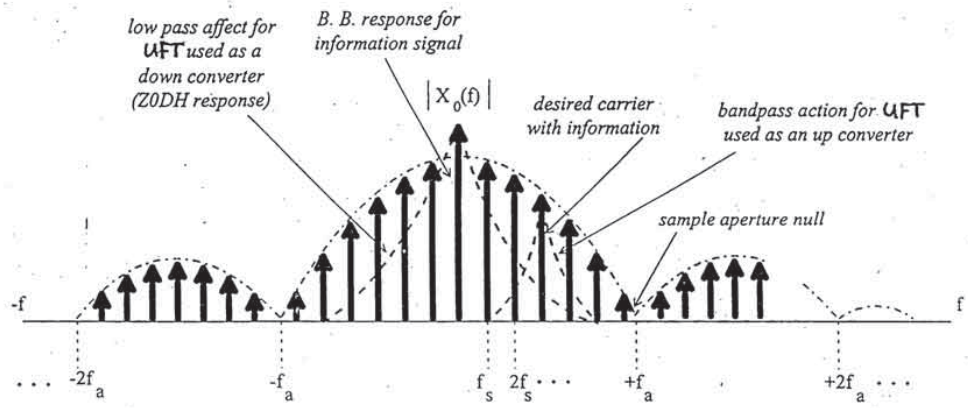


FIG. 191

PRINT OF DRAWINGS AS ORIGINALLY FILED

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PRINT OF DRAWINGS
AS ORIGINALLY FIL

FIG. 192

PRINT OF DRAWINGS
AS ORIGINALLY FILED

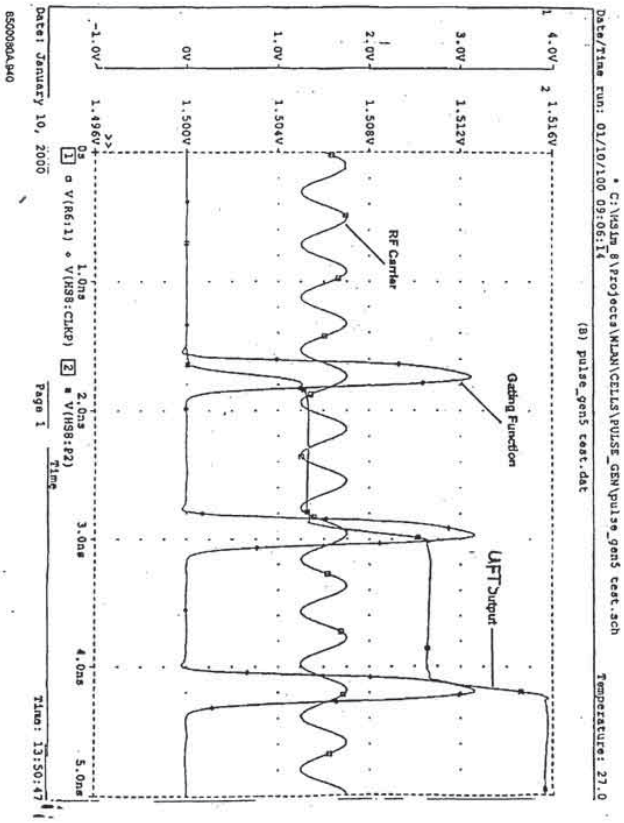


FIG. 193

PRINT OF DRAWINGS
AS ORIGINALLY FIL

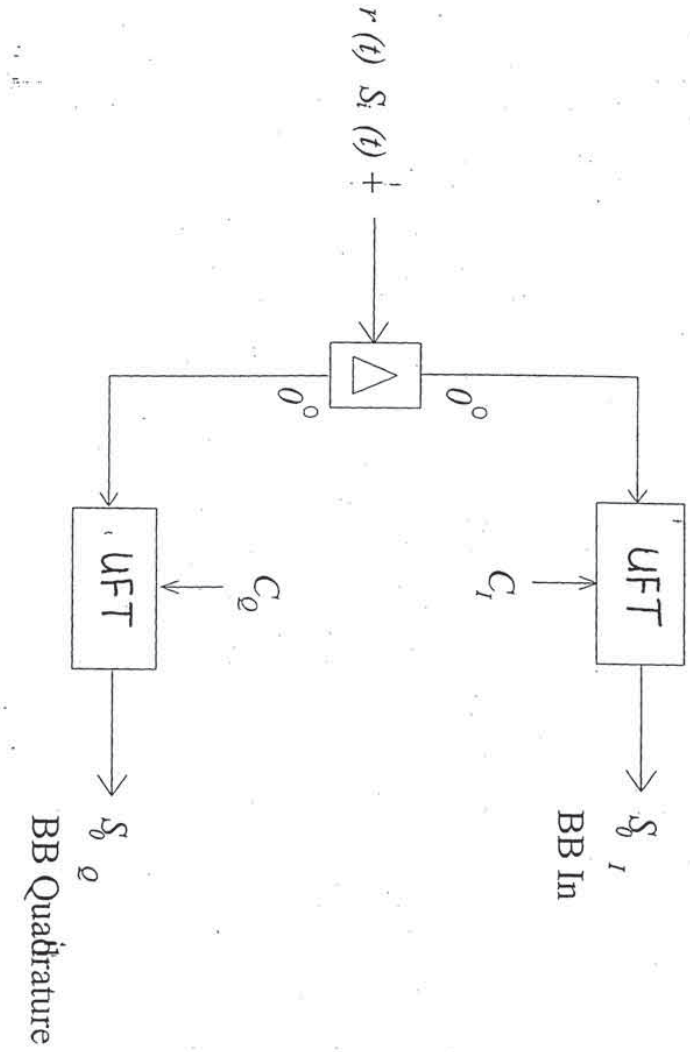


FIG. 194

PRINT OF DRAWINGS
AS ORIGINALLY FILED

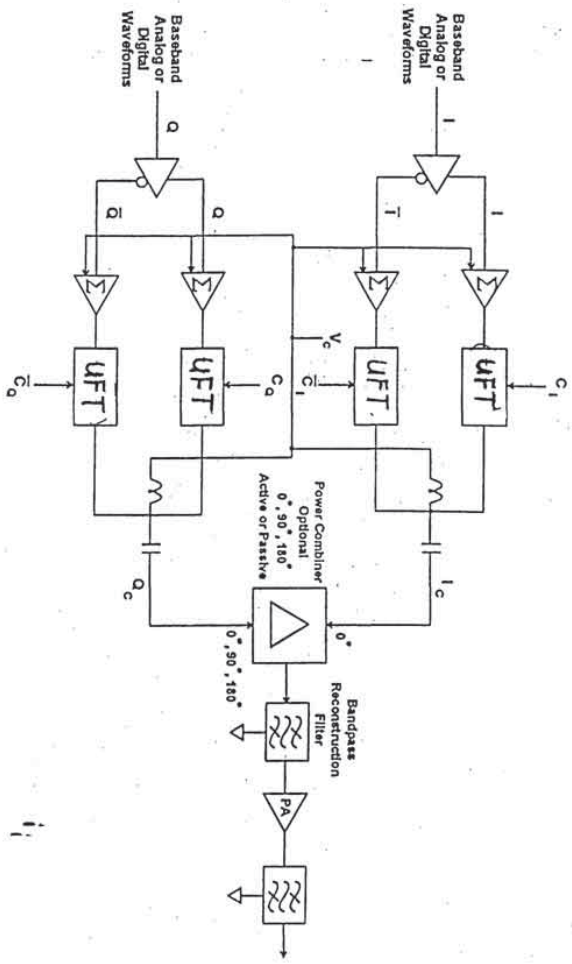


FIG. 195

PRINT OF DRAWINGS
AS ORIGINALLY FIL

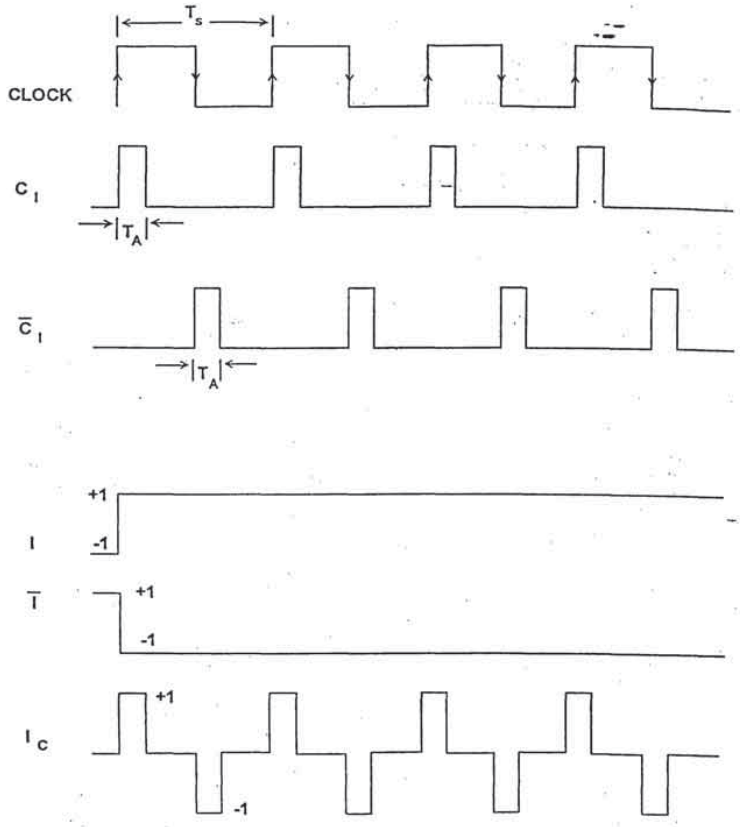


FIG. 196

PRINT OF DRAWINGS
AS ORIGINALLY FD
Fig. 197
UFT Module
LNA (opt.)
Signal
Output
Baseband
I
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197AA
197AC
197AE
197B0
197B2
197B4
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197B8
197BA
197BC
197BE
197C0
197C2
197C4
197C6
197C8
197CA
197CC
197CE
197D0
197D2
197D4
197D6
197D8
197DA
197DC
197DE
197E0
197E2
197E4
197E6
197E8
197EA
197EC
197EE
197F0
197F2
197F4
197F6
197F8
197FA
197FC
197FE
19800
19802
19804
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198EA
198EC
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19AAE
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19AB8
19ABA
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19E28
19E2A
19E2C
19E2E
19E30
19E32
19E34
19E36
19E38
19E3A
19E3C
19E3E
19E40
19E42
19E44
19E46
19E48
19E4A
19E4C
19E4E
19E50
19E52
19E54
19E56
19E58
19E5A
19E5C
19E5E
19E60
19E62
19E64
19E66
19E68
19E6A
19E6C
19E6E
19E70
19E72
19E74
19E76
19E78
19E7A
19E7C
19E7E
19E80
19E82
19E84
19E86
19E88
19E8A
19E8C
19E8E
19E90
19E92
19E94
19E96
19E98
19E9A
19E9C
19E9E
19EA0
19EA2
19EA4
19EA6
19EA8
19EAA
19EAC
19EAE
19EB0
19EB2
19EB4
19EB6
19EB8
19EBA
19EBC
19EBE
19EC0
19EC2
19EC4
19EC6
19EC8
19ECA
19ECC
19ECE
19ED0
19ED2
19ED4
19ED6
19ED8
19EDA
19EDC
19EDE
19EE0
19EE2
19EE4
19EE6
19EE8
19EEA
19EEC
19EEE
19EF0
19EF2
19EF4
19EF6
19EF8
19EFA
19EFC
19EFE
19F00
19F02
19F04
19F06
19F08
19F0A
19F0C
19F0E
19F10
19F12
19F14
19F16
19F18
19F1A
19F1C
19F1E
19F20
19F22
19F24
19F26
19F28
19F2A
19F2C
19F2E
19F30
19F32
19F34
19F36
19F38
19F3A
19F3C
19F3E
19F40
19F42
19F44
19F46
19F48
19F4A
19F4C
19F4E
19F50
19F52
19F54
19F56
19F58
19F5A
19F5C
19F5E
19F60
19F62
19F64
19F66
19F68
19F6A
19F6C
19F6E
19F70
19F72
19F74
19F76
19F78
19F7A
19F7C
19F7E
19F80
19F82
19F84
19F86
19F88
19F8A
19F8C
19F8E
19F90
19F92
19F94
19F96
19F98
19F9A
19F9C
19F9E
19FA0
19FA2
19FA4
19FA6
19FA8
19FAA
19FAC
19FAE
19FB0
19FB2
19FB4
19FB6
19FB8
19FBA
19FBC
19FBE
19FC0
19FC2
19FC4
19FC6
19FC8
19FCA
19FCC
19FCE
19FD0
19FD2
19FD4
19FD6
19FD8
19FDA
19FDC
19FDE
19FE0
19FE2
19FE4
19FE6
19FE8
19FEA
19FEC
19FEE
19FF0
19FF2
19FF4
19FF6
19FF8
19FFA
19FFC
19FFE

PRINT OF DRAWINGS
AS ORIGINALLY FILED

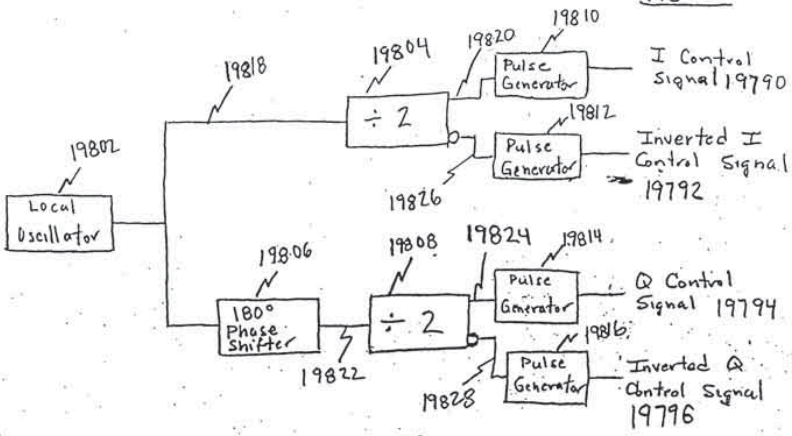


FIG. 198

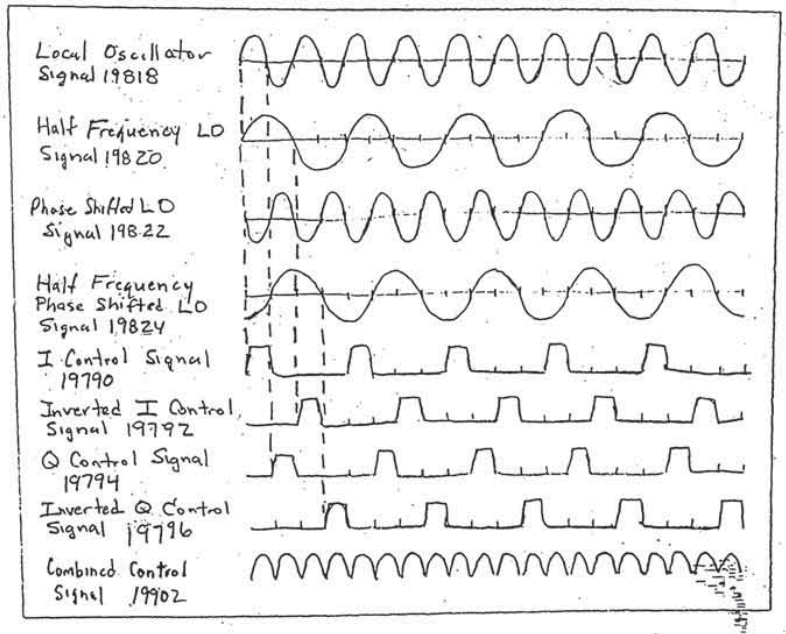


FIG. 199

PRINT OF DRAWINGS
AS ORIGINALLY FILED

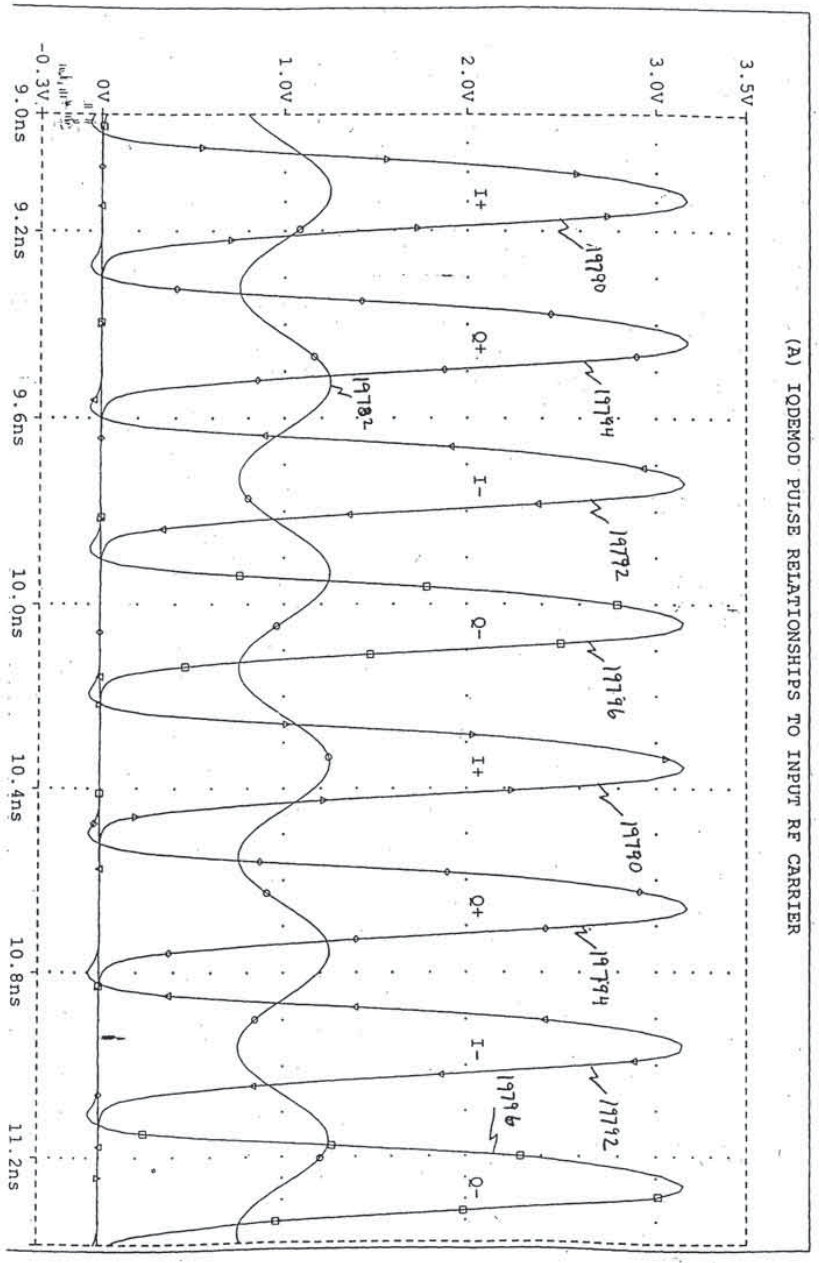


FIG. 200

PRINT OF DRAWINGS
AS ORIGINALLY FILED

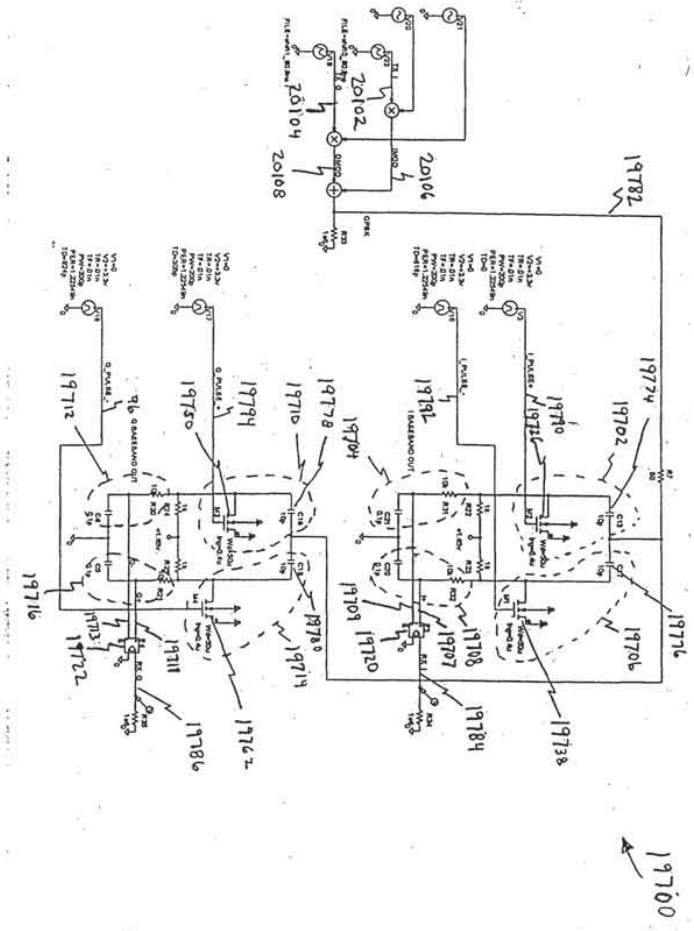
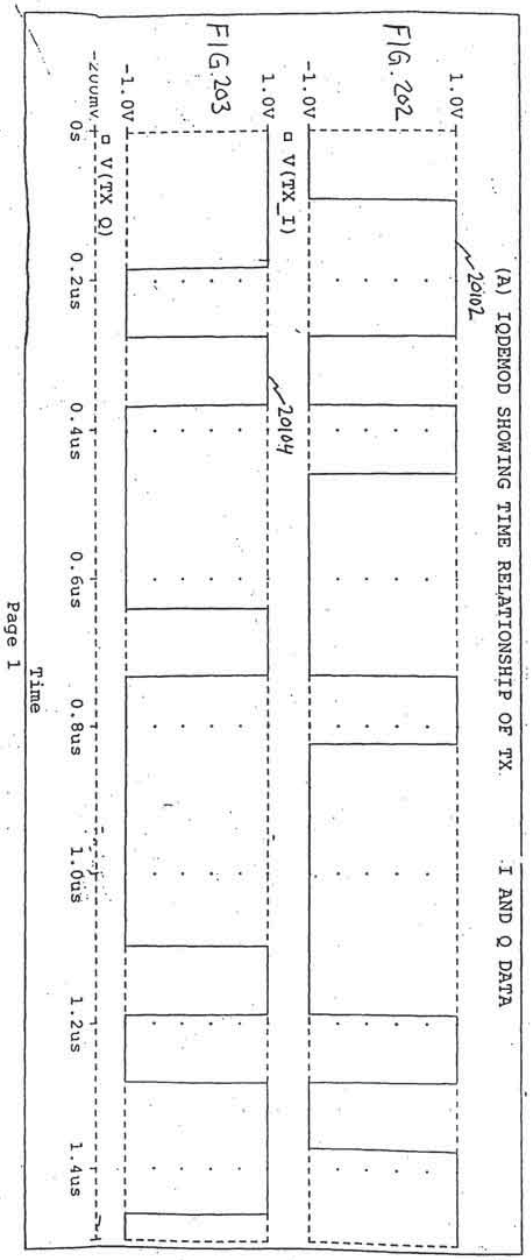
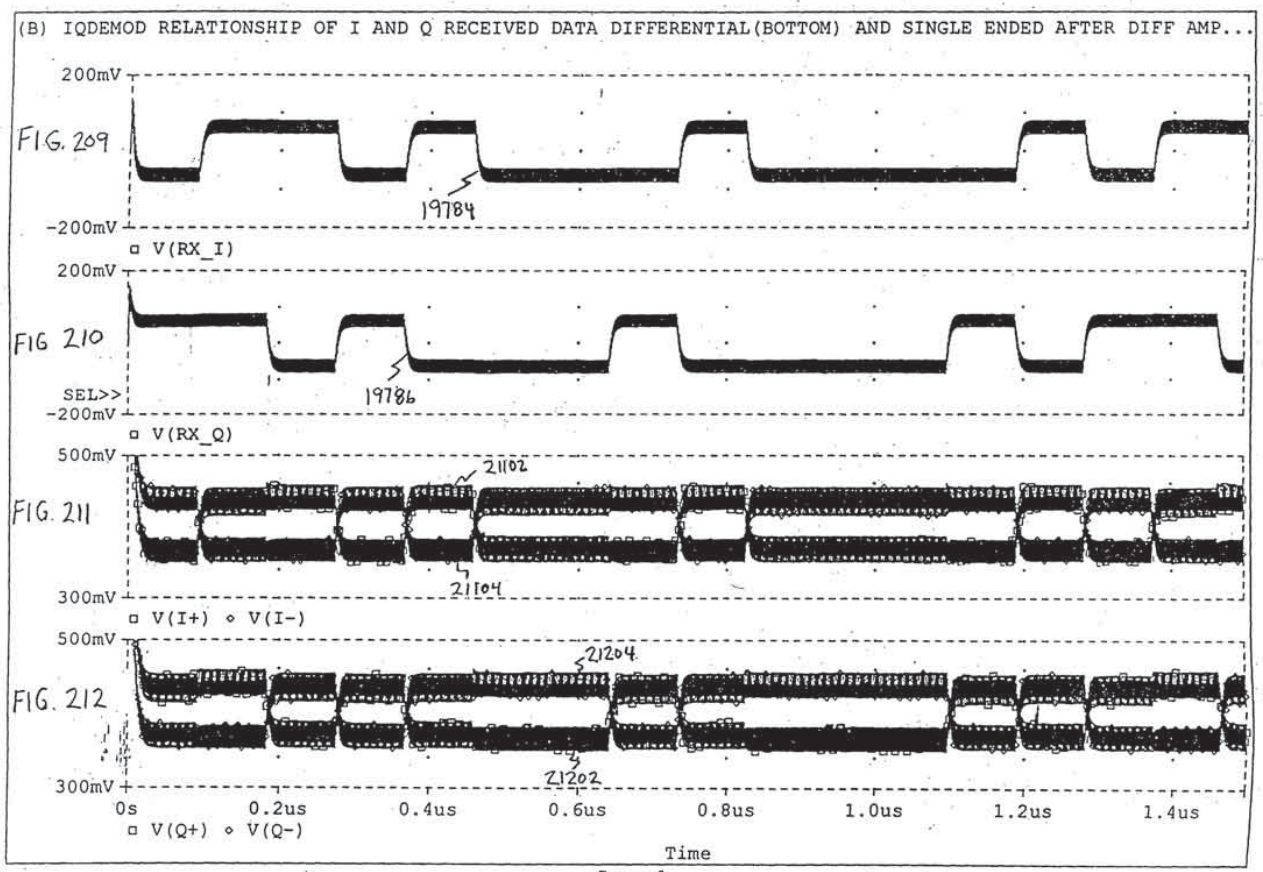


FIG. 201

PRINT OF DRAWINGS
AS ORIGINALLY FILED



PRINT OF DRAWINGS
AS ORIGINALLY FIL



PRINT OF DRAWINGS
AS ORIGINALLY FILED

901

PRINT OF DRAWINGS
AS ORIGINALLY FILED

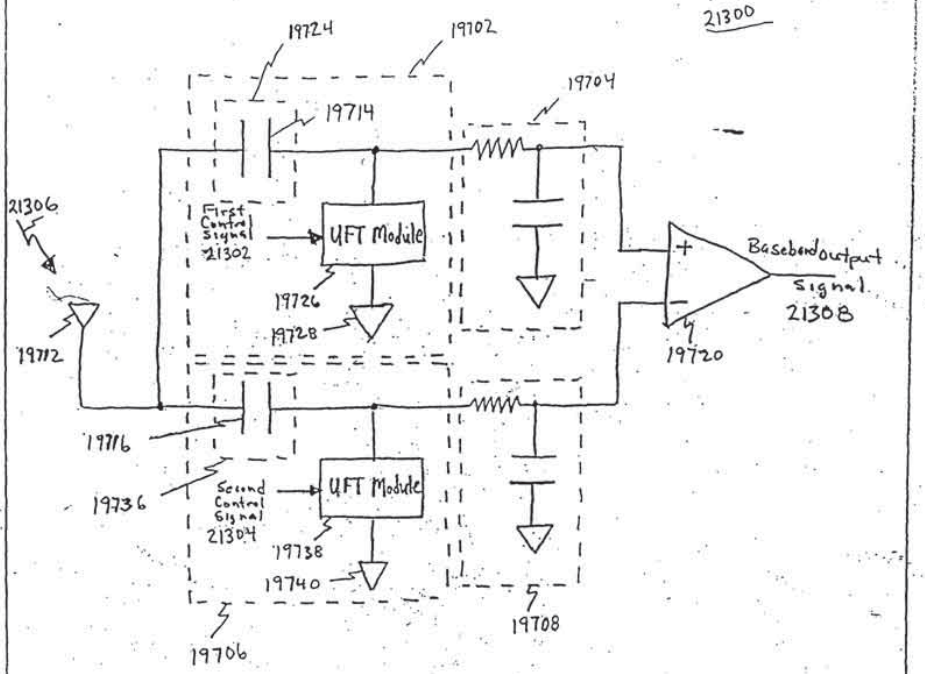


FIG. 213

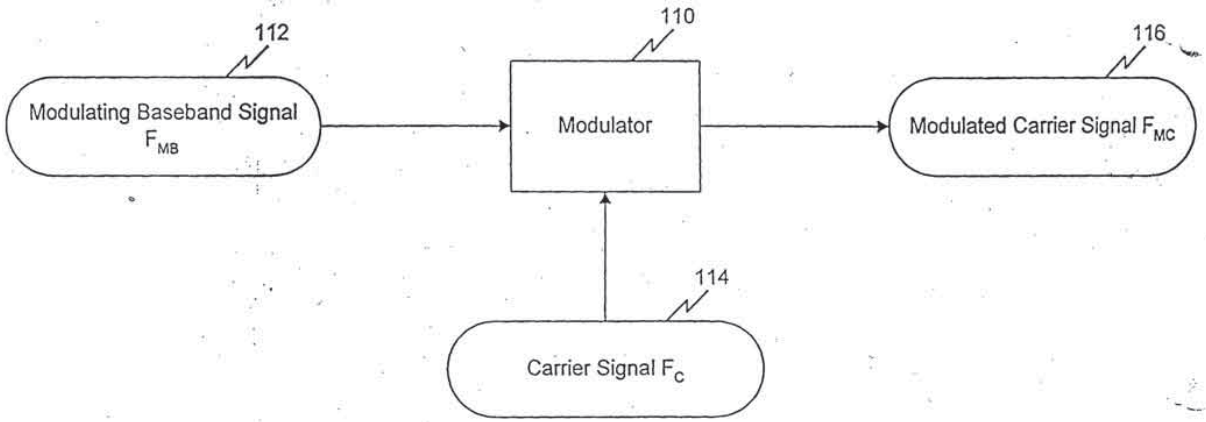
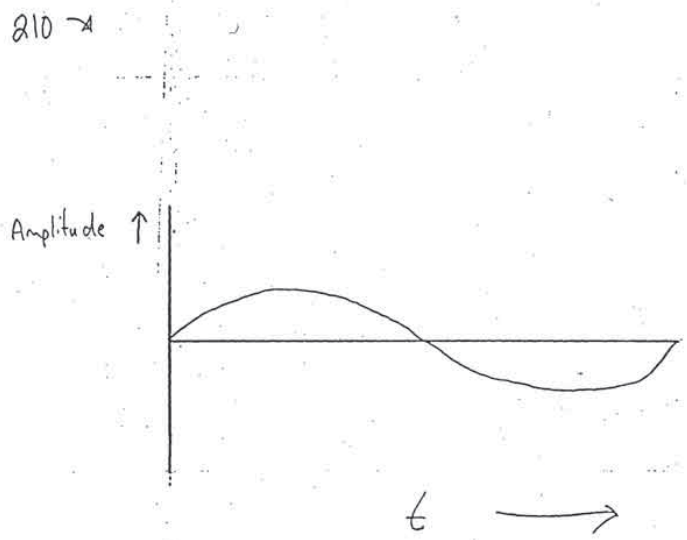


FIG. 1

09521879.030900

National Brand
42-381 50 SHEETS EYE-EASE® 8 SQUARE
42-382 100 SHEETS EYE-EASE® 8 SQUARE
42-389 200 SHEETS EYE-EASE® 8 SQUARE
42-392 100 RECYCLED WHITE 8 SQUARE
42-399 200 RECYCLED WHITE 8 SQUARE

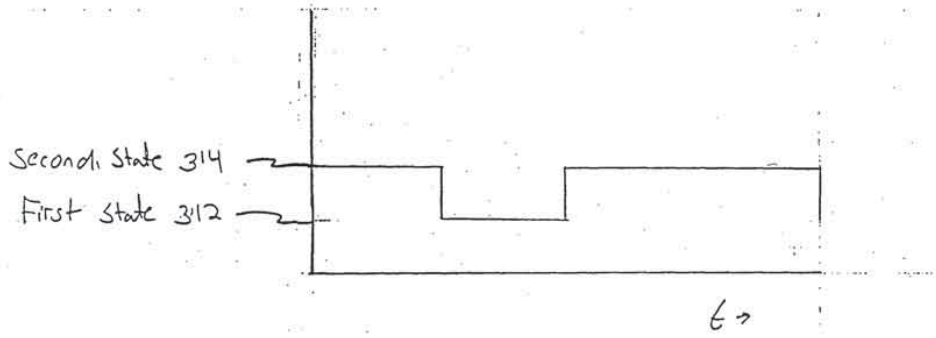


Example Analog Modulating Baseband Signal F_{MB}

FIG. 2

09521879.030900

National® Brand
13-782 500 SHEETS, FILLER 8 SQUARE
42-361 50 SHEETS EYE-EASE® 8 SQUARE
42-362 100 SHEETS EYE-EASE® 8 SQUARE
42-369 200 SHEETS EYE-EASE® 8 SQUARE
42-392 100 RECYCLED WHITE 8 SQUARE
42-398 200 RECYCLED WHITE 8 SQUARE
Made in U.S.A.



Example Digital Modulating Baseband Signal F_{MB}

FIG. 3

905

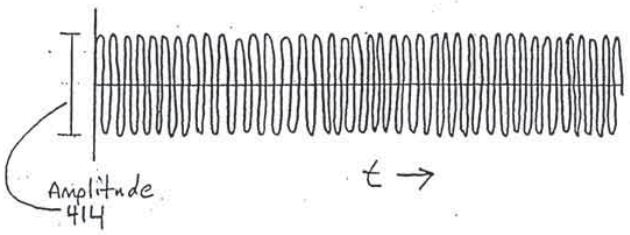


FIG. 4

Analog Baseband Signal 210

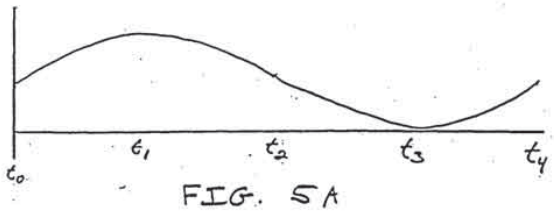


FIG. 5A

Carrier Signal 410

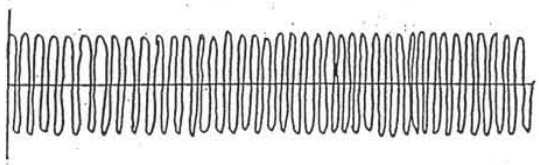


FIG. 5B

AM Carrier Signal 516

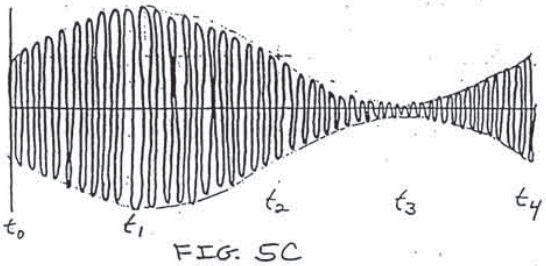


FIG. 5C

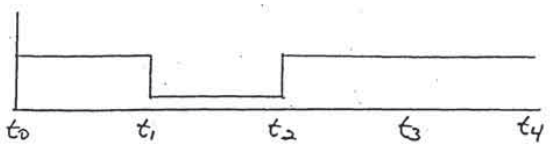


FIG. 6A

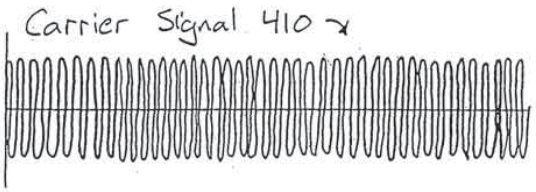


FIG. 6B

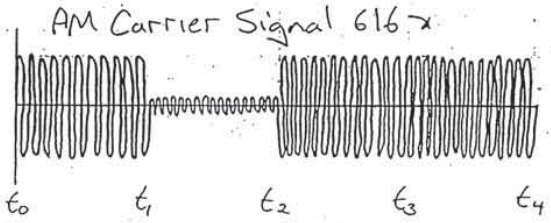


FIG. 6C

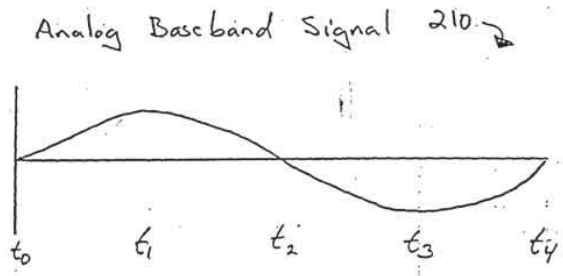


FIG. 7A

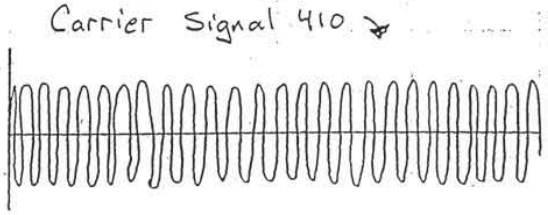


FIG. 7B

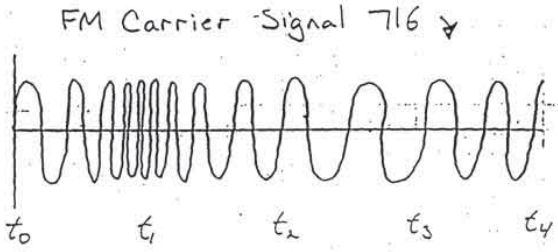


FIG. 7C

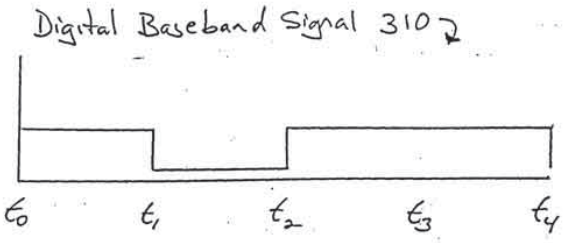


FIG. 8A

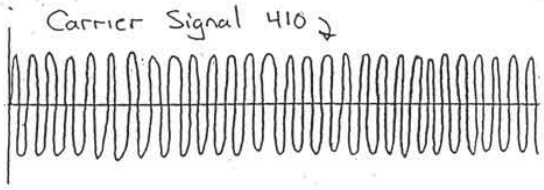


FIG. 8B

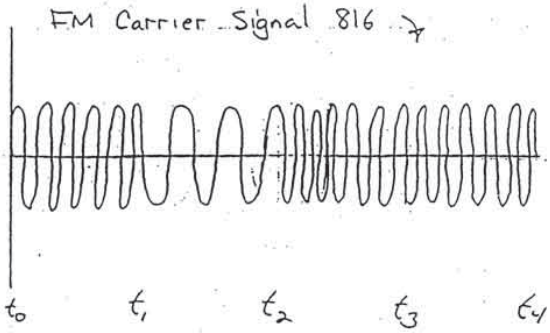


FIG 8C

Analog Baseband Signal 210

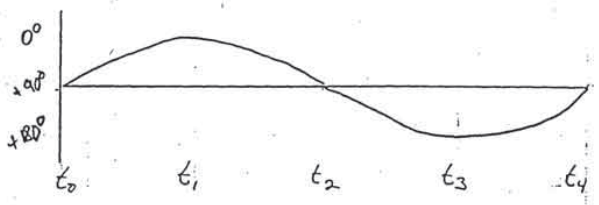


FIG. 9A

Carrier Signal 410

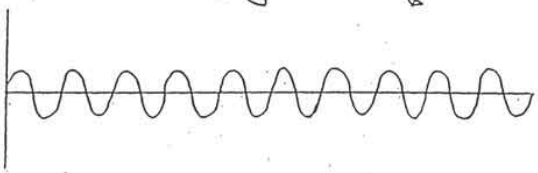


FIG. 9B

Phase Modulated Carrier Signal 916

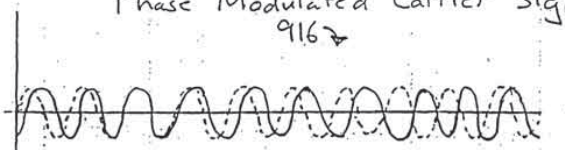


FIG. 9C

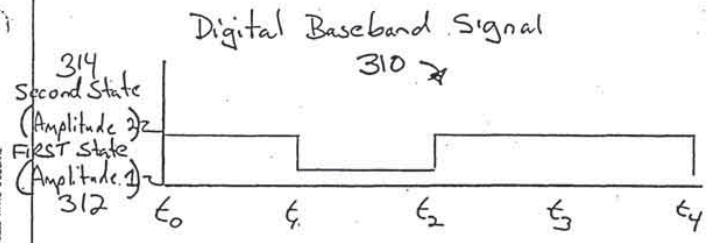


FIG. 10A

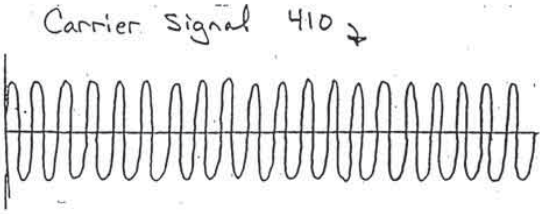


FIG. 10B

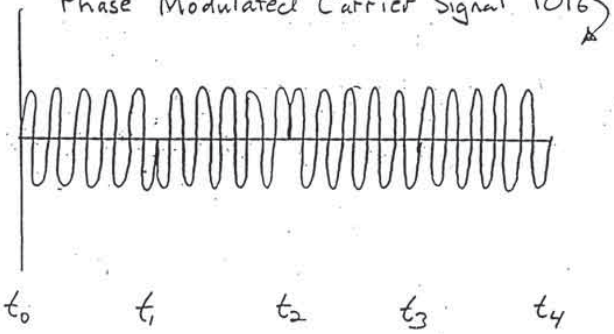


FIG. 10C

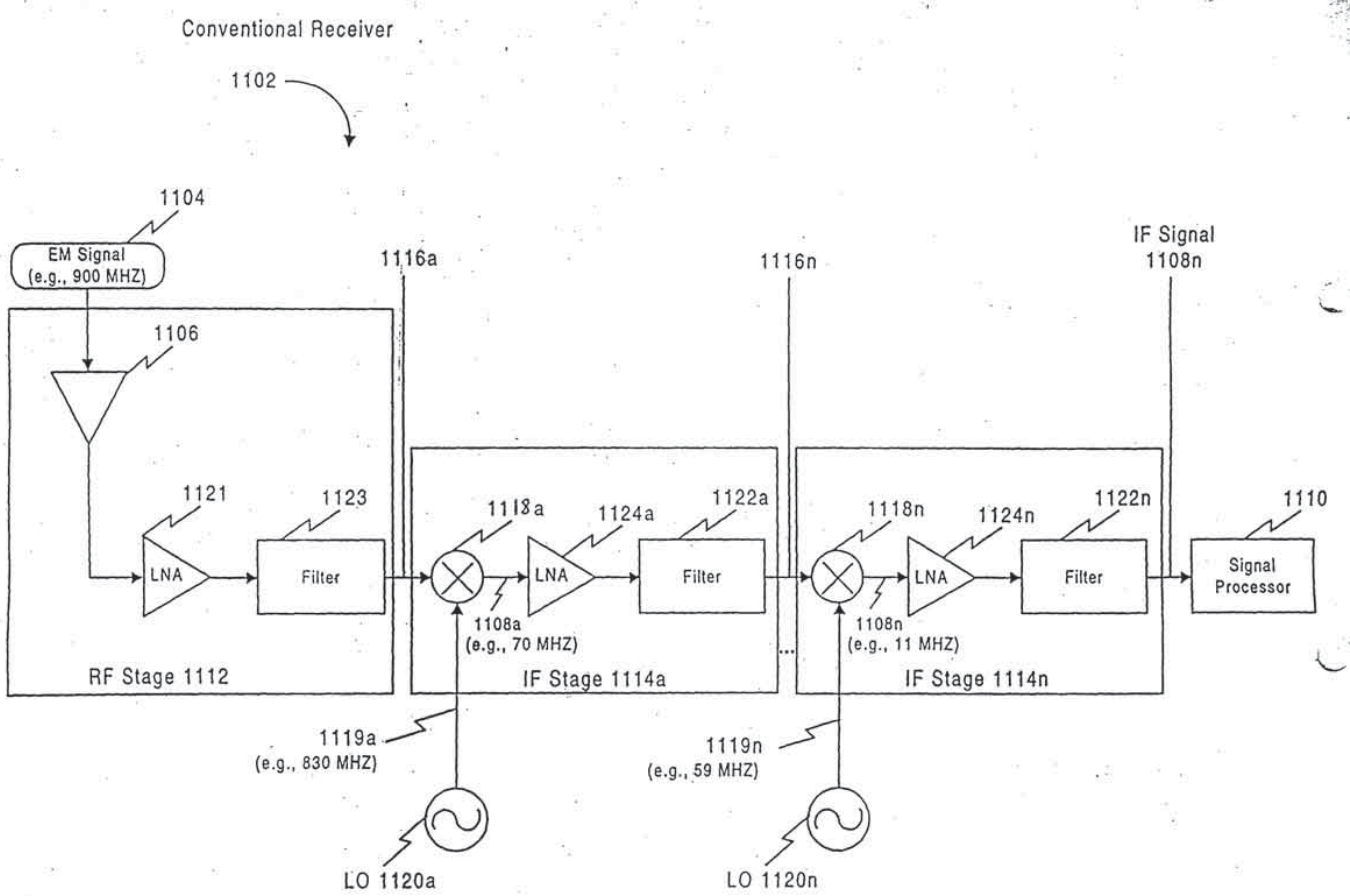
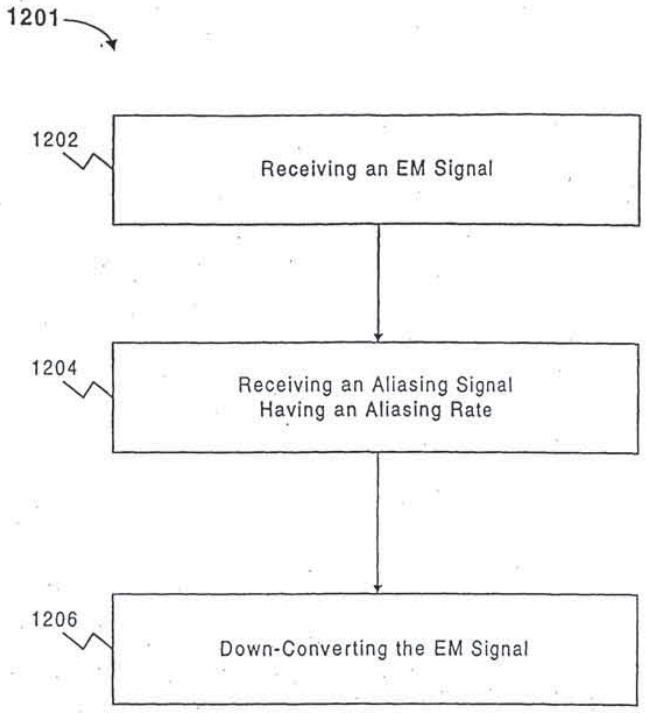


FIG. 11

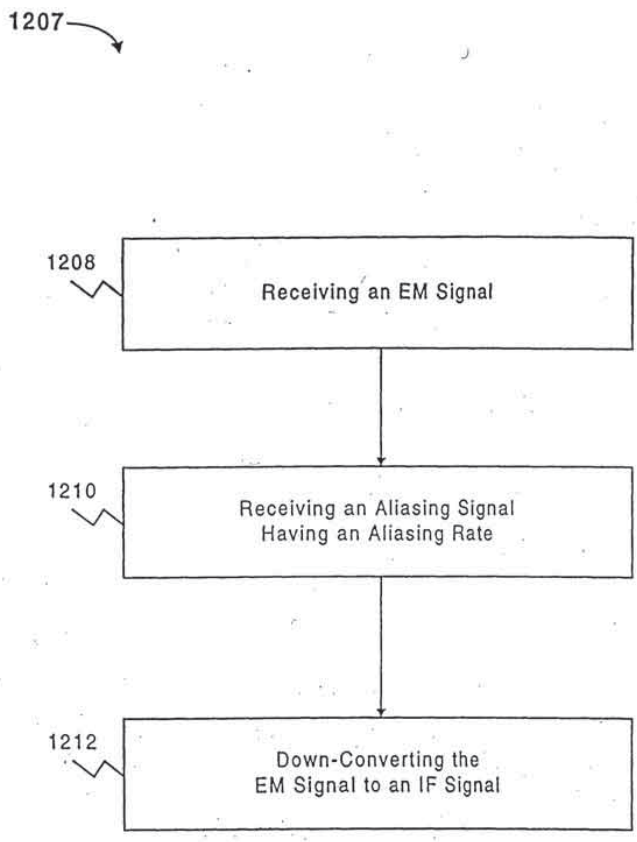
09521879.030900



Generic Down-Converting
Flowchart

FIG. 12A

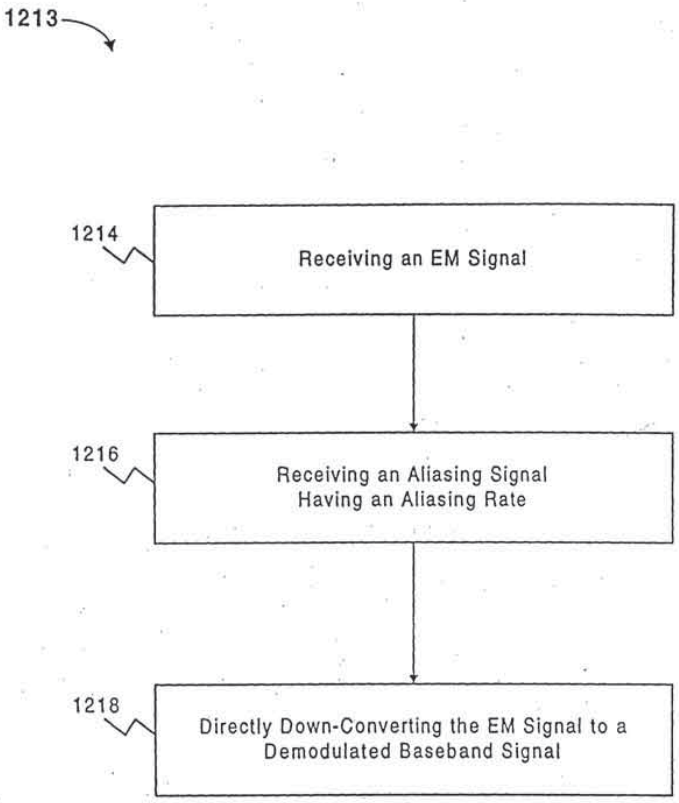
9807-09.vsd/1



Down-Converting an
EM Signal to an IF Signal

FIG. 12B

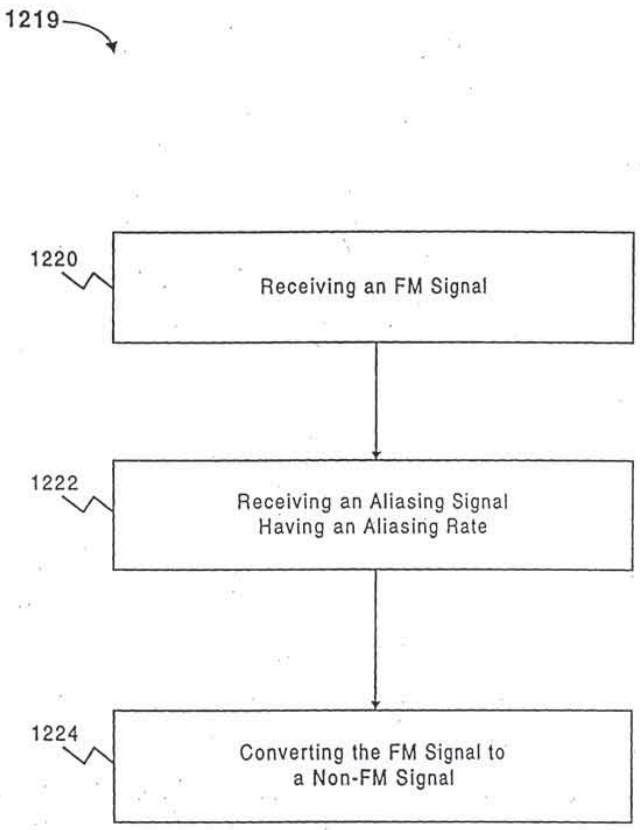
9807-09.vsd/2



Directly Down-Converting an EM Signal to a Demodulated Baseband Signal

FIG. 12C

9807-09.vsd/3

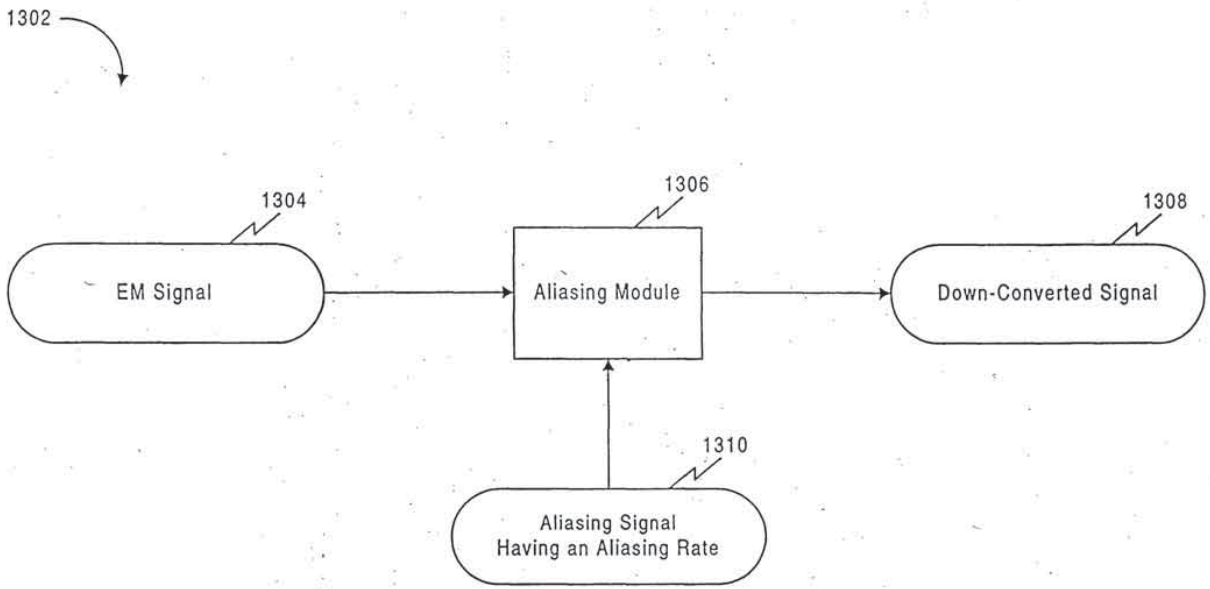


Modulation Conversion

FIG. 12D

S

9807-09.vsd/4



Generic Down-Converting System

FIG. 13

09521879.030900

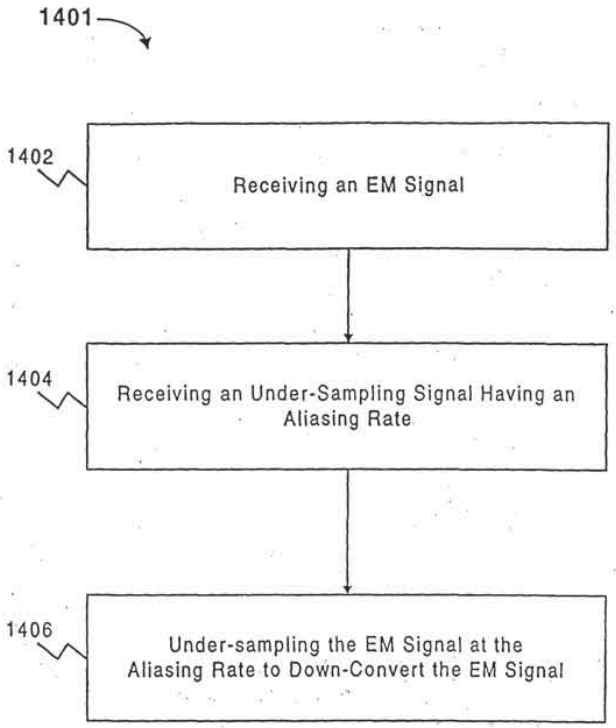


FIG. 14A

9807-09.vsd/7

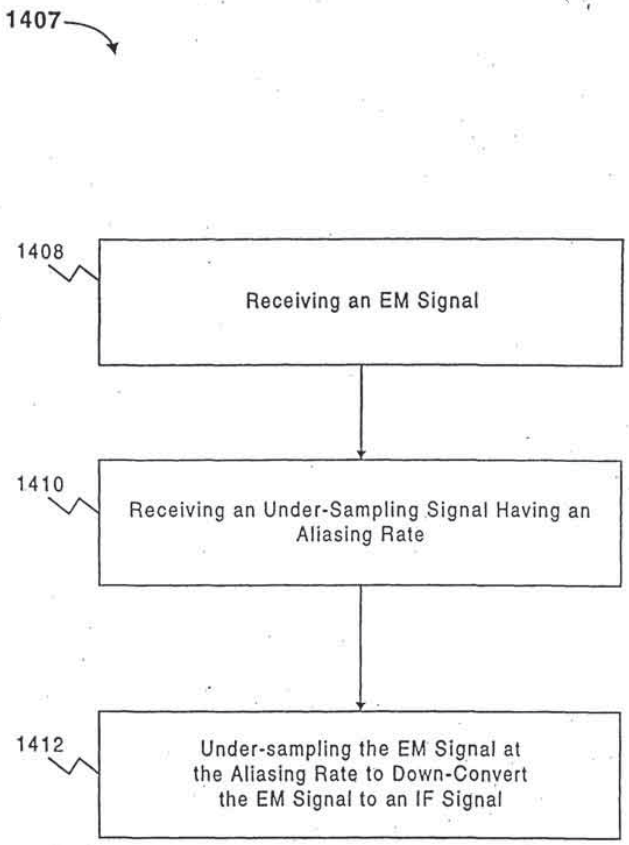


FIG. 14B

9807-09.vsd/8

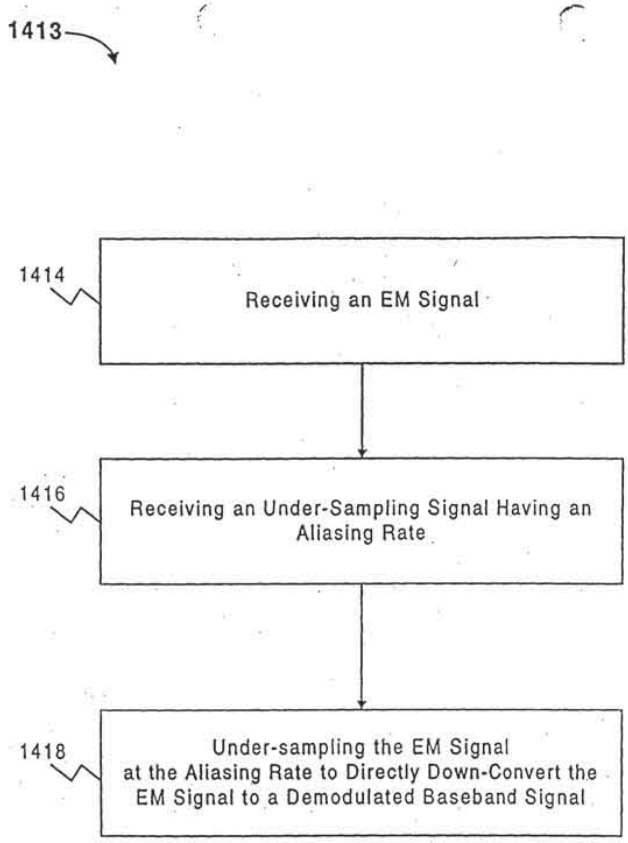


FIG. 14C

0060820 6787560

5

9807-09.vsd/9

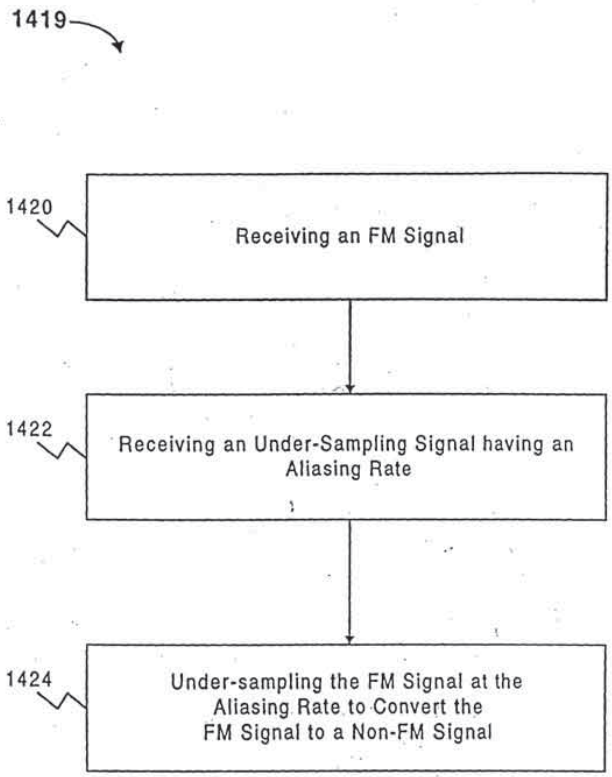
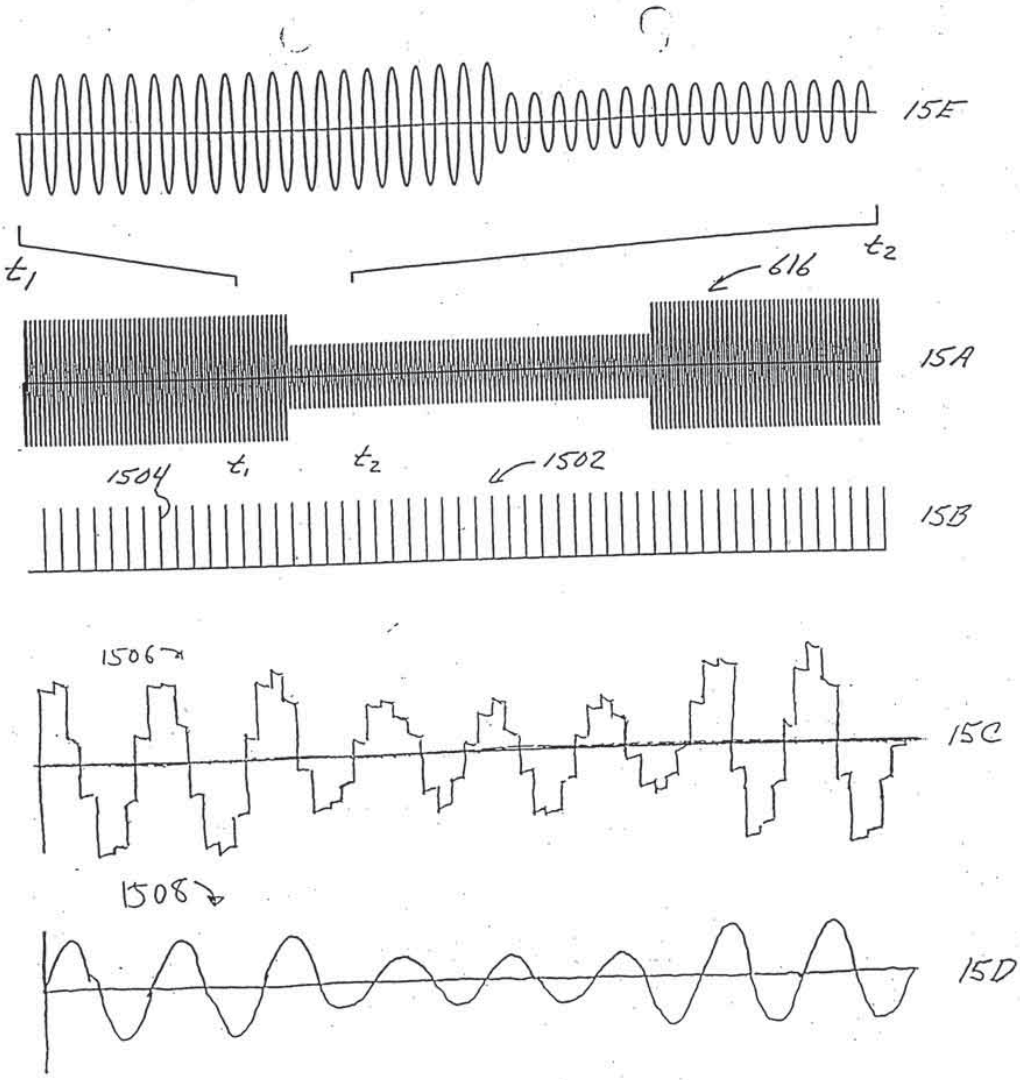


FIG. 14D

9807-09.vsd/10


15E
t_1
t_2
616
15A
1504
t_1
t_2
1502
15B
1506
15C
1508
15D

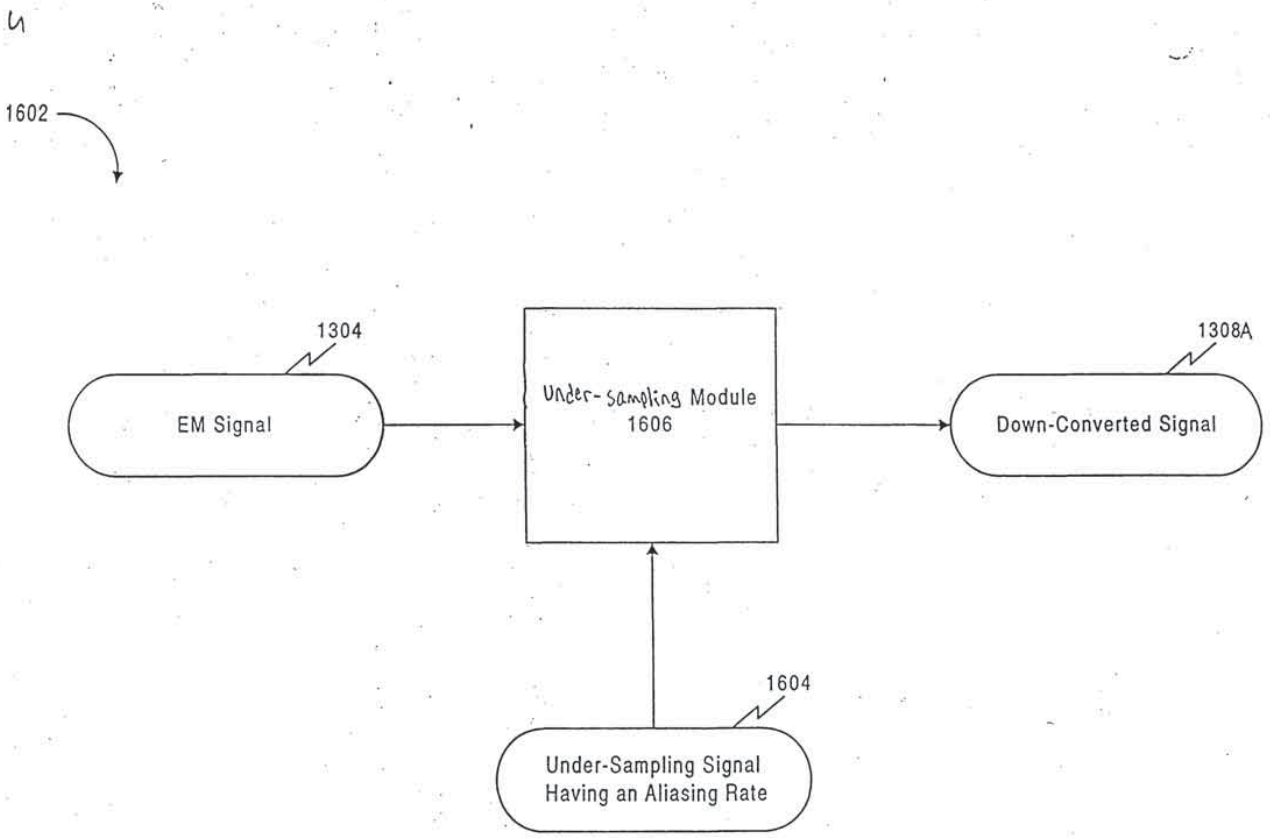

1602
1304
EM Signal
Under-sampling Module
1606
1308A
Down-Converted Signal
1604
Under-Sampling Signal
Having an Aliasing Rate

FIG. 16

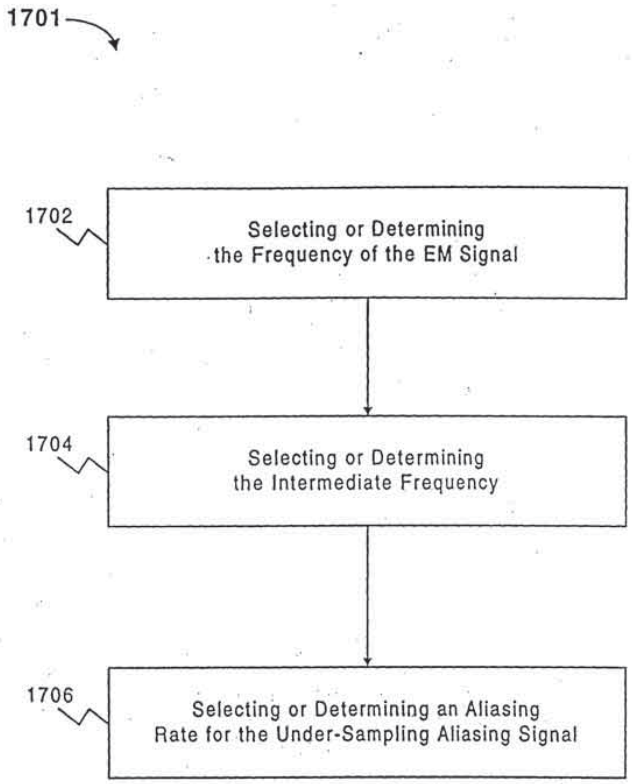


FIG. 17

9807-09.vsd/11

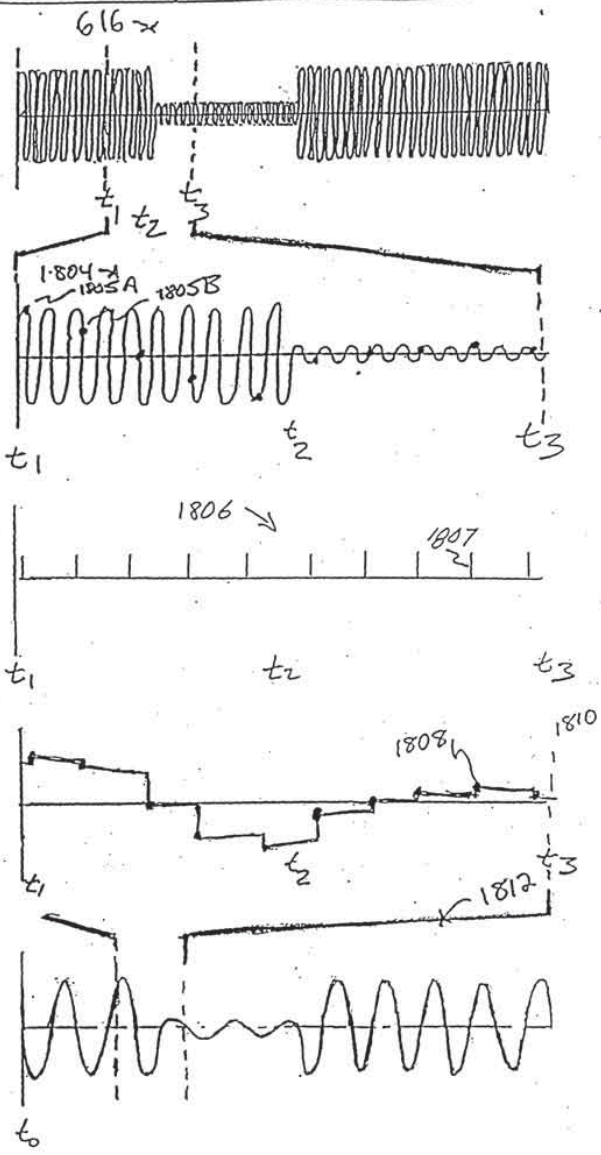


FIG. 18A

FIG. 18B

FIG. 18C

FIG. 18D

FIG. 18E

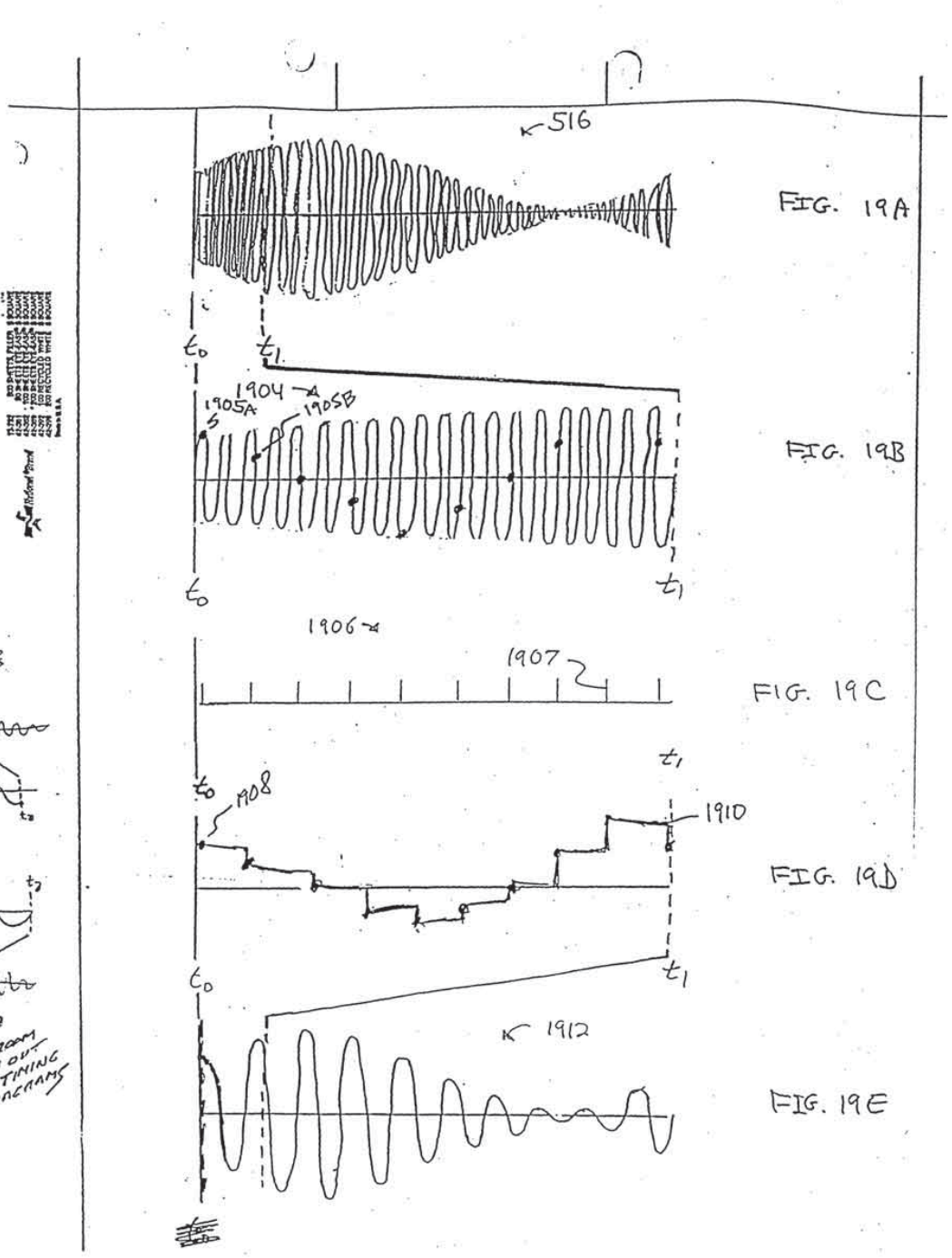


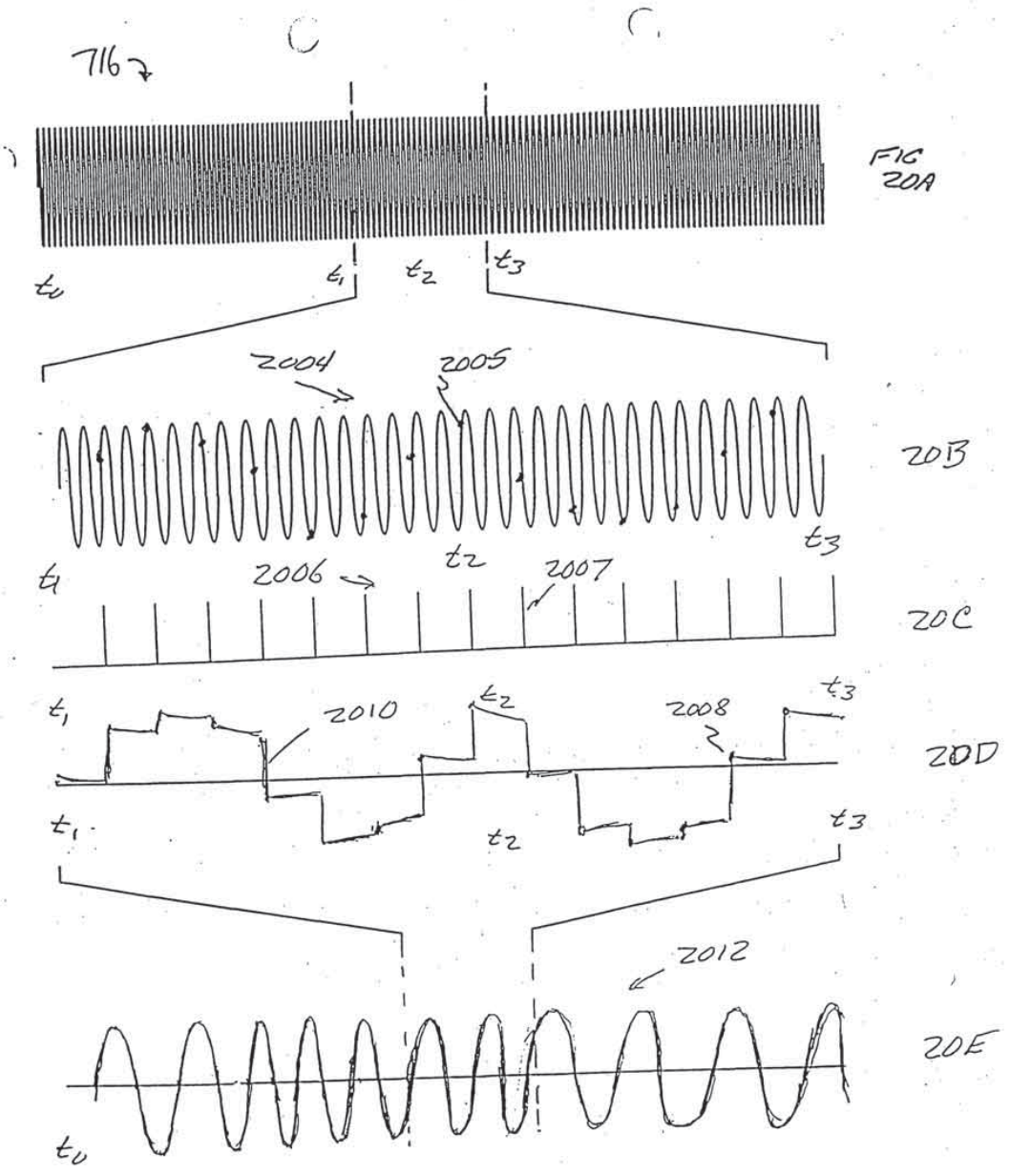
FIG. 19A

FIG. 19B

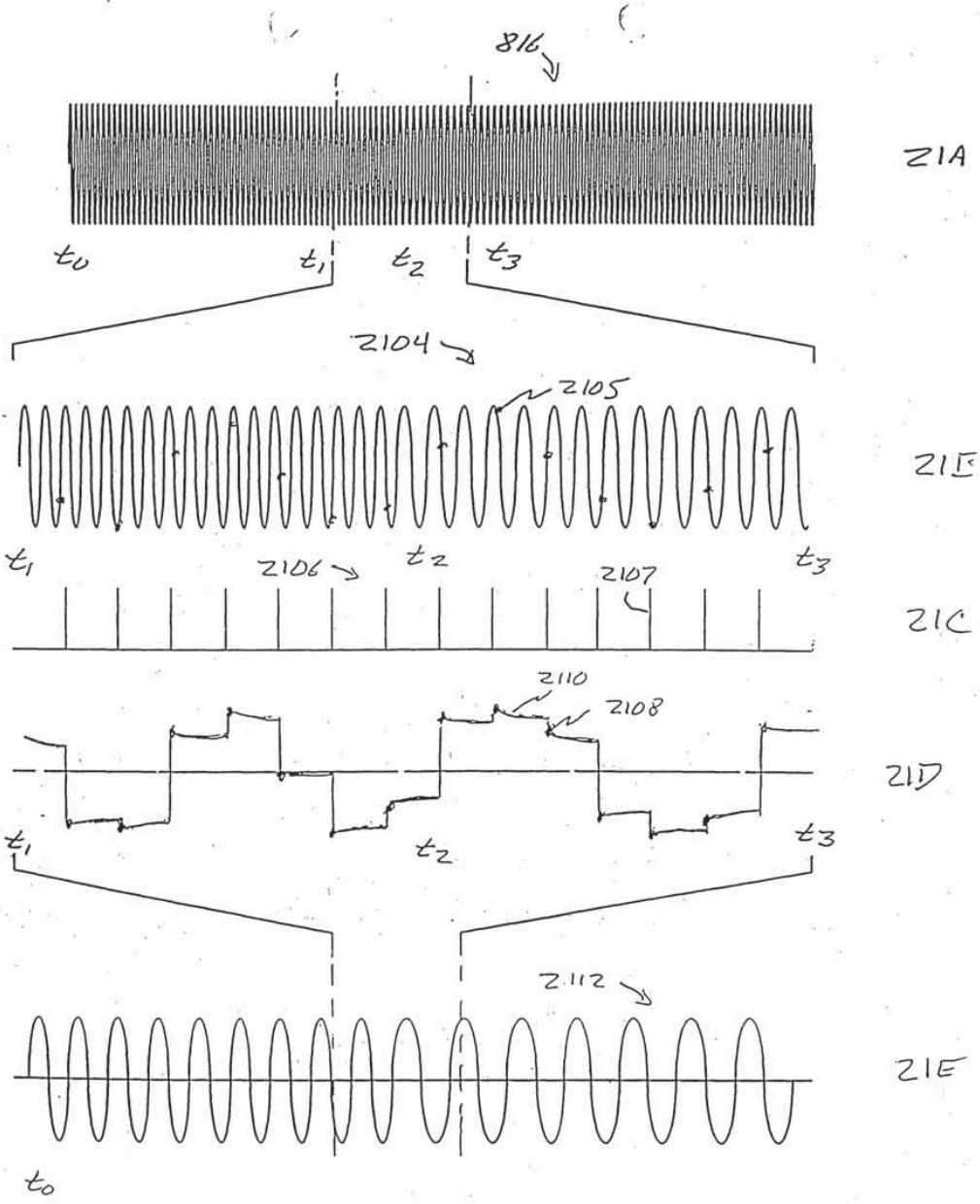
FIG. 19C

FIG. 19D

FIG. 19E

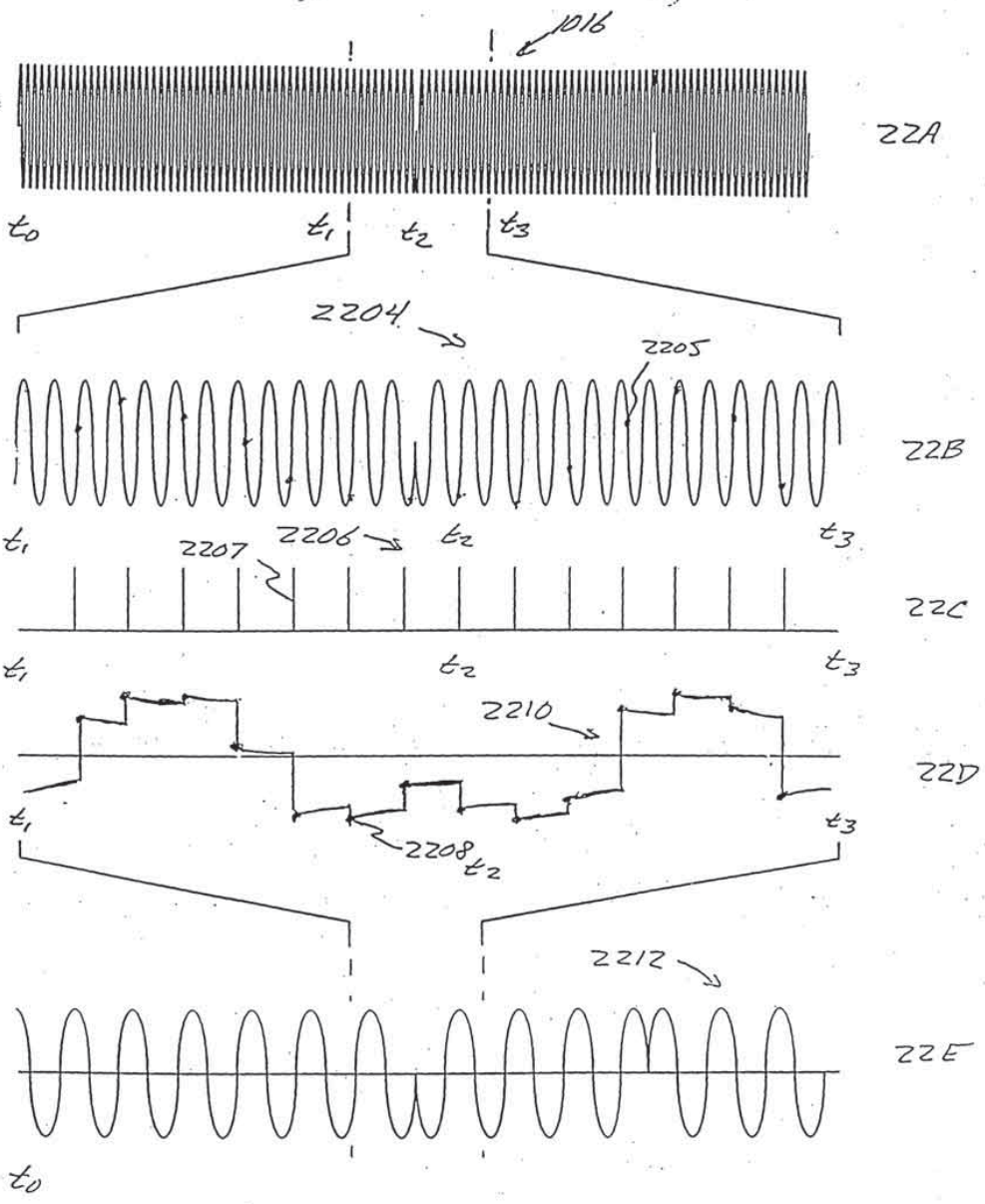


ParkerVision Confidential
Printed: 10/1/98, 11:33:31 AM
Filename: analog-fm1.vsd



5

ParkerVision Confidential
Printed: 10/1/98, 1:51:32 PM
Filename: digital-fm1.vsd



ParkerVision Confidential
Printed: 10/1/98, 2:24:20 PM
Filename: digital-pm1.vsd

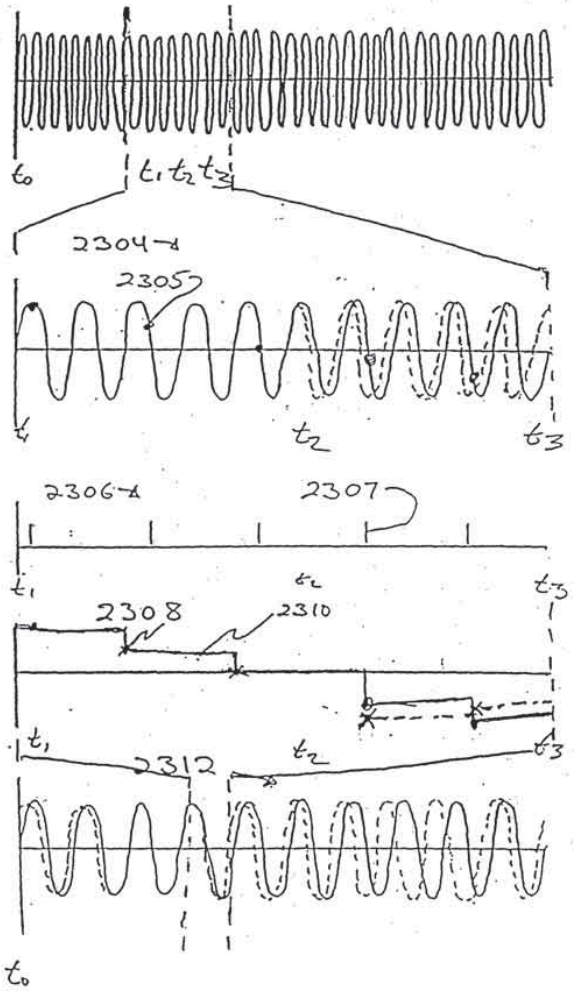


FIG. 23A

FIG. 23B

FIG. 23C

FIG. 23D

FIG. 23E

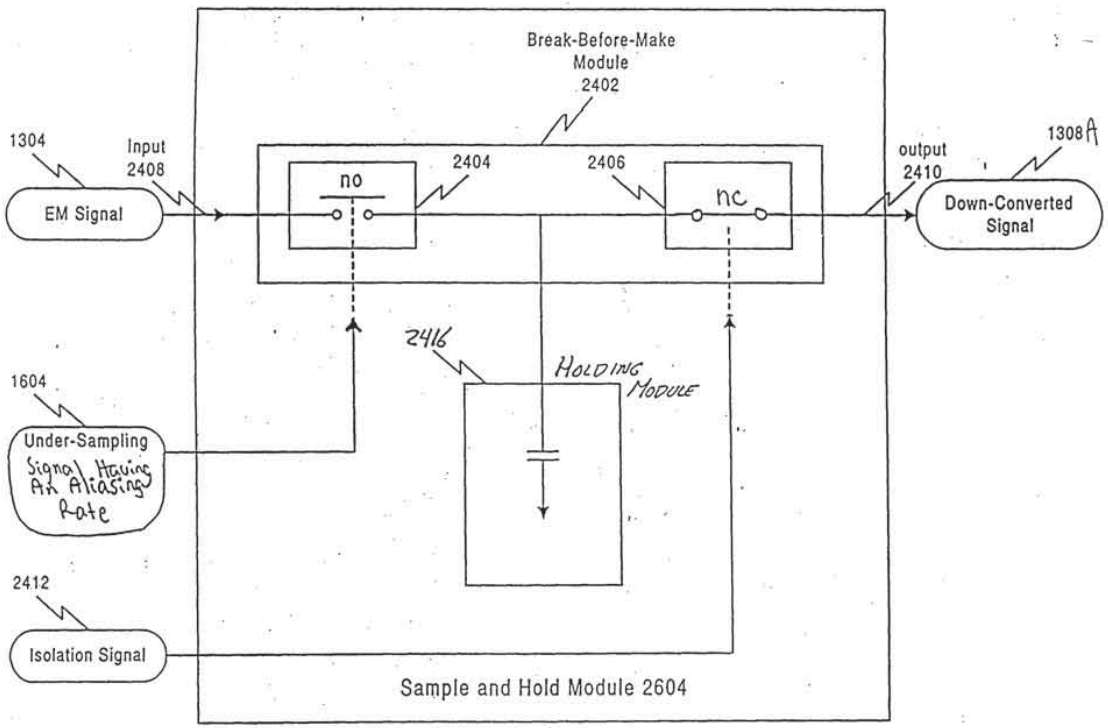


FIG. 24A

09521879.030900

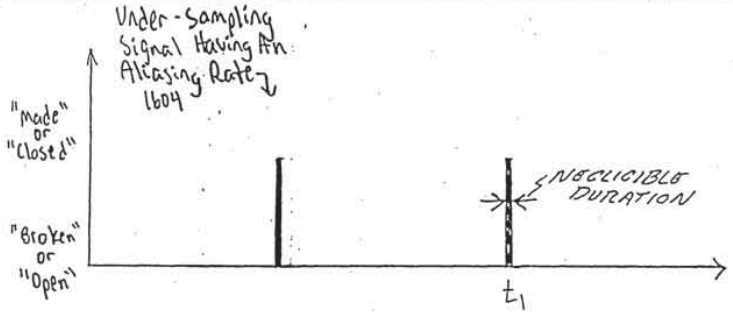


FIG. 24B

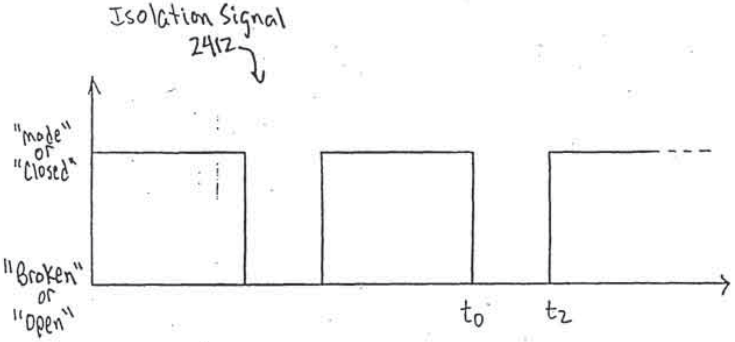
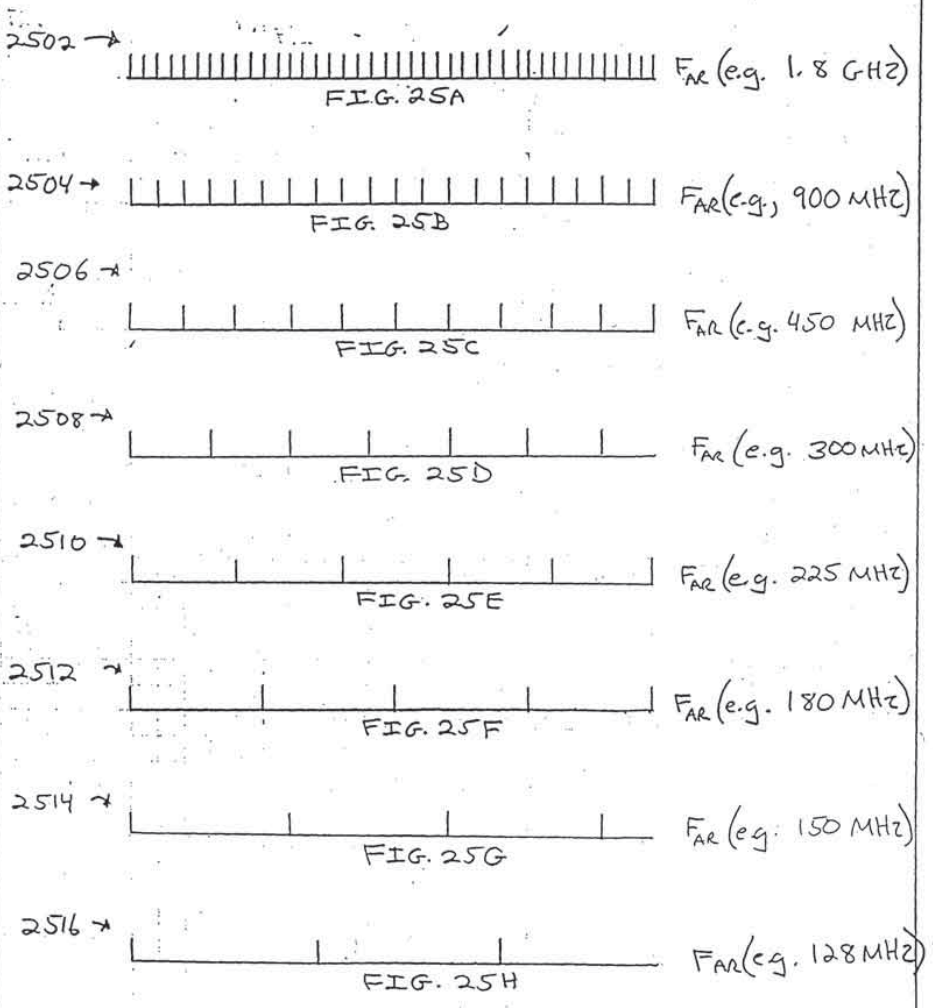


FIG. 24C


2502
F_{AR} (e.g. 1.8 GHz)
FIG. 25A
2504
F_{AR} (e.g., 900 MHz)
FIG. 25B
2506
F_{AR} (e.g. 450 MHz)
FIG. 25C
2508
F_{AR} (e.g. 300 MHz)
FIG. 25D
2510
F_{AR} (e.g. 225 MHz)
FIG. 25E
2512
F_{AR} (e.g. 180 MHz)
FIG. 25F
2514
F_{AR} (e.g. 150 MHz)
FIG. 25G
2516
F_{AR} (e.g. 128 MHz)
FIG. 25H

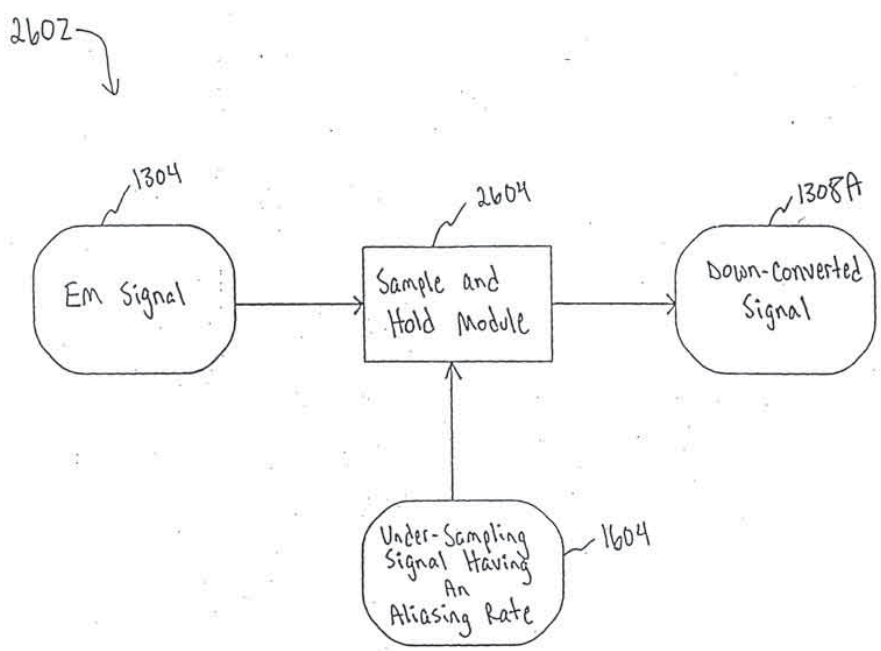

2602
1304
Em Signal
2604
Sample and Hold Module
1308A
Down-Converted Signal
Under-Sampling Signal Having An Aliasing Rate
1604

FIG. 26A

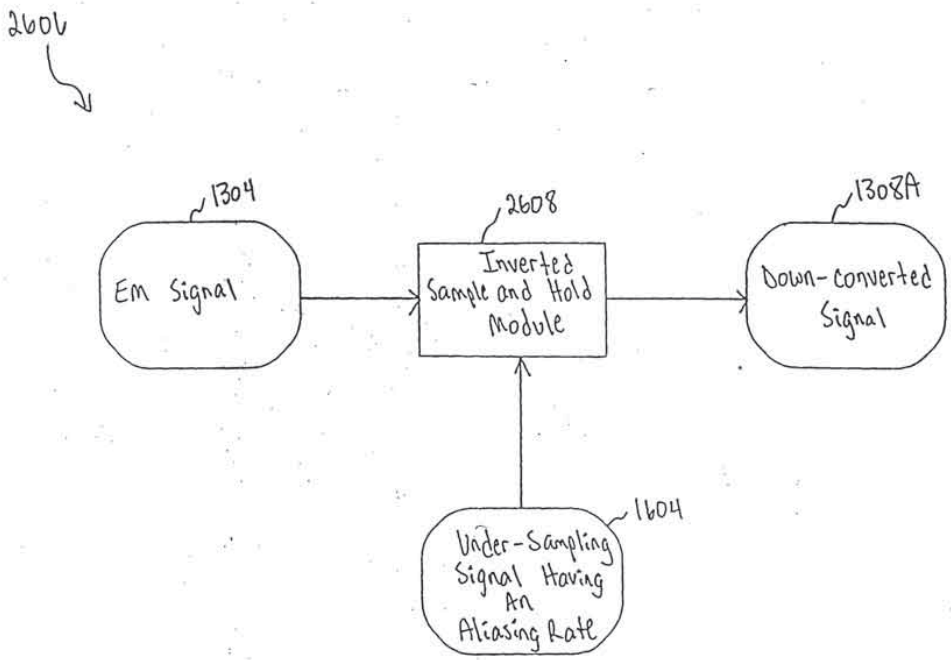

2606
1304
EM Signal
2608
Inverted Sample and Hold Module
1308A
Down-converted Signal
1604
Under-Sampling Signal Having An Aliasing Rate

FIG. 26B

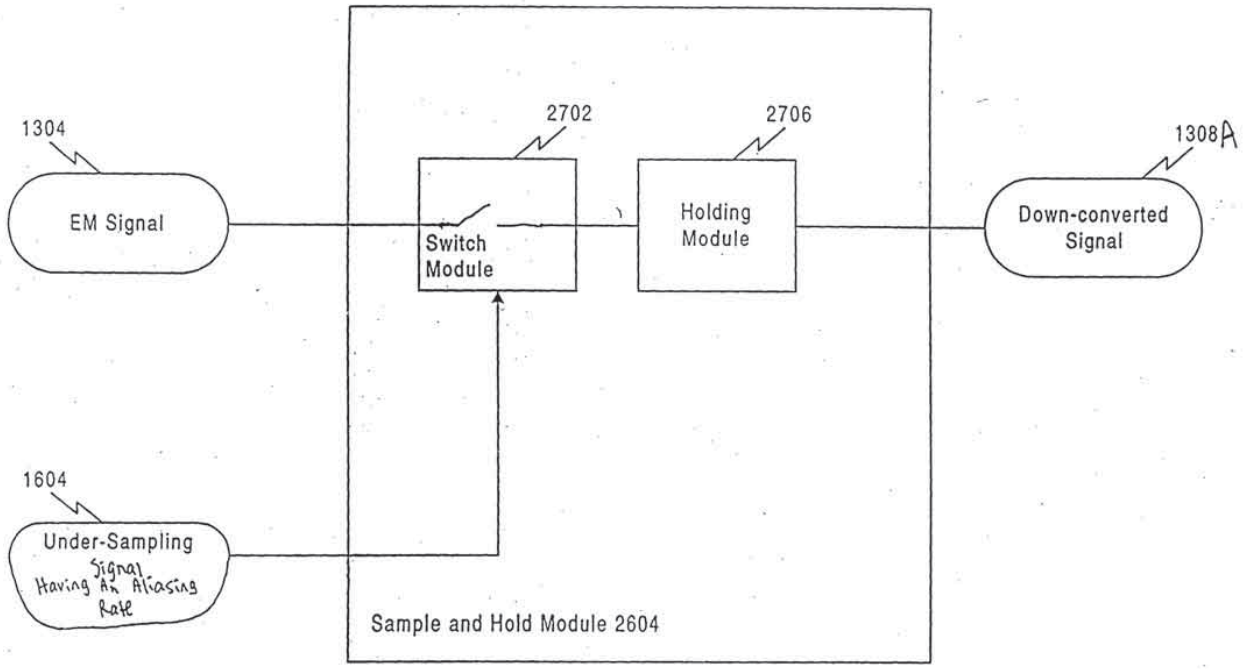


FIG. 27

09521879.030900

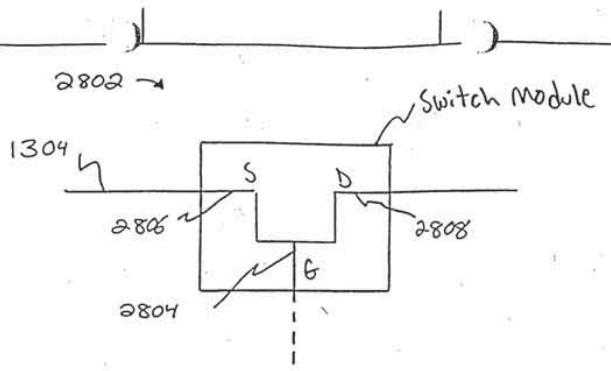


FIG. 28A

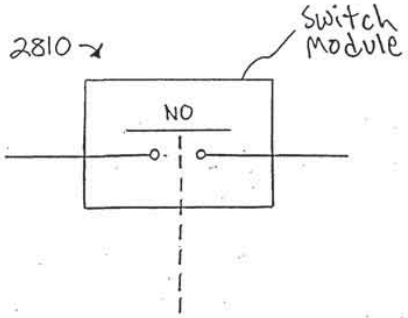


FIG. 28B

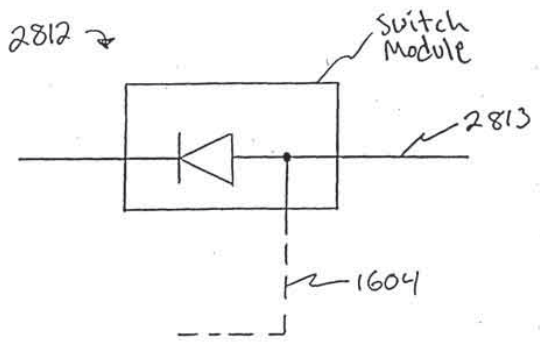


FIG. 28C

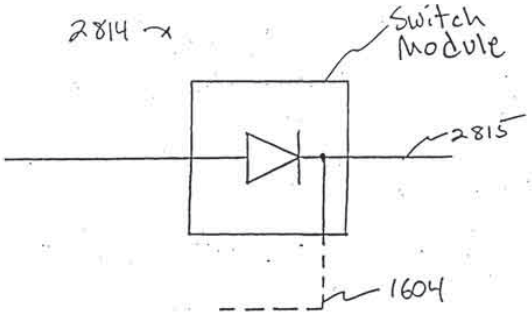


FIG. 28D

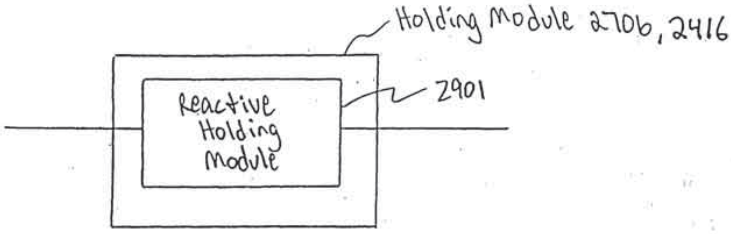


FIG. 29A

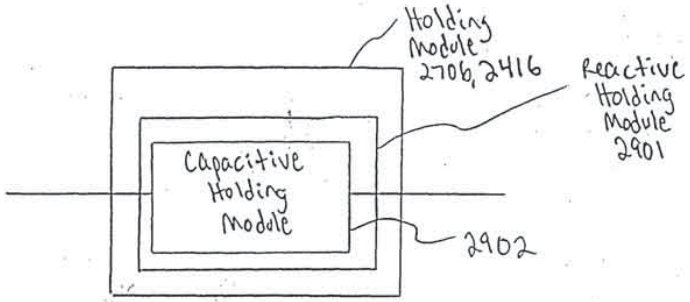


FIG. 29B

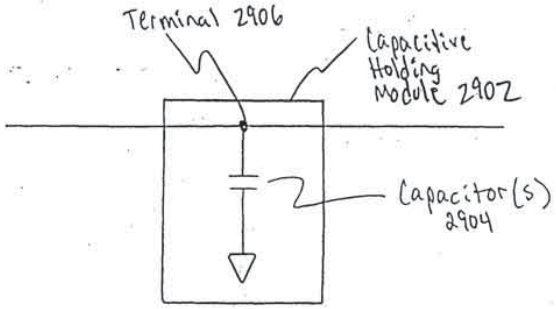


FIG. 29C

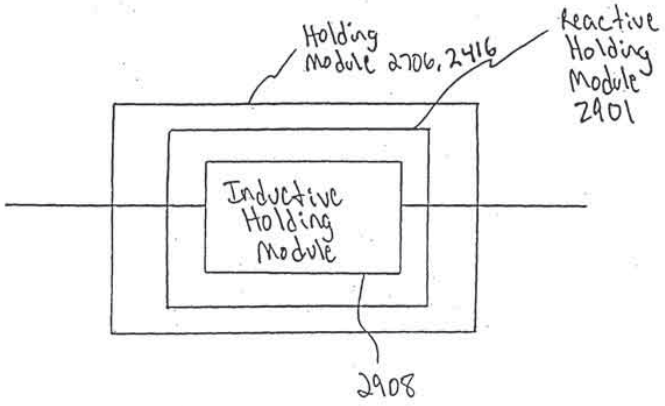


FIG. 29D

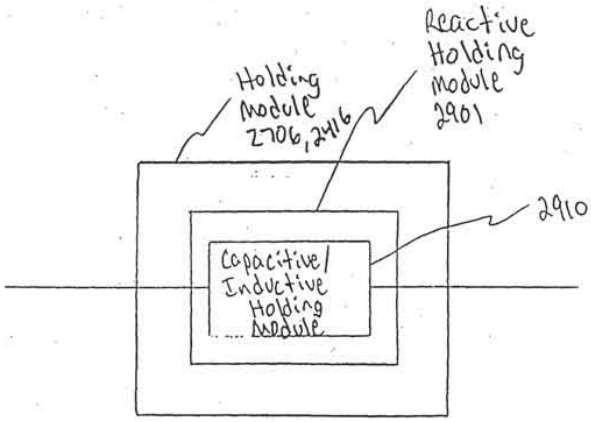


FIG. 29E

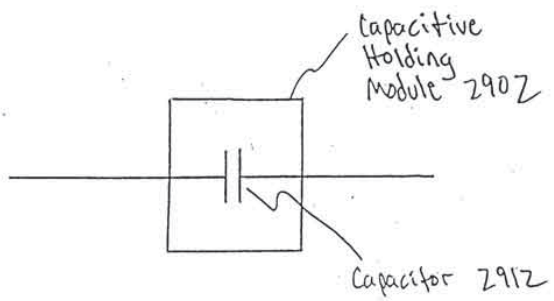


FIG. 29F

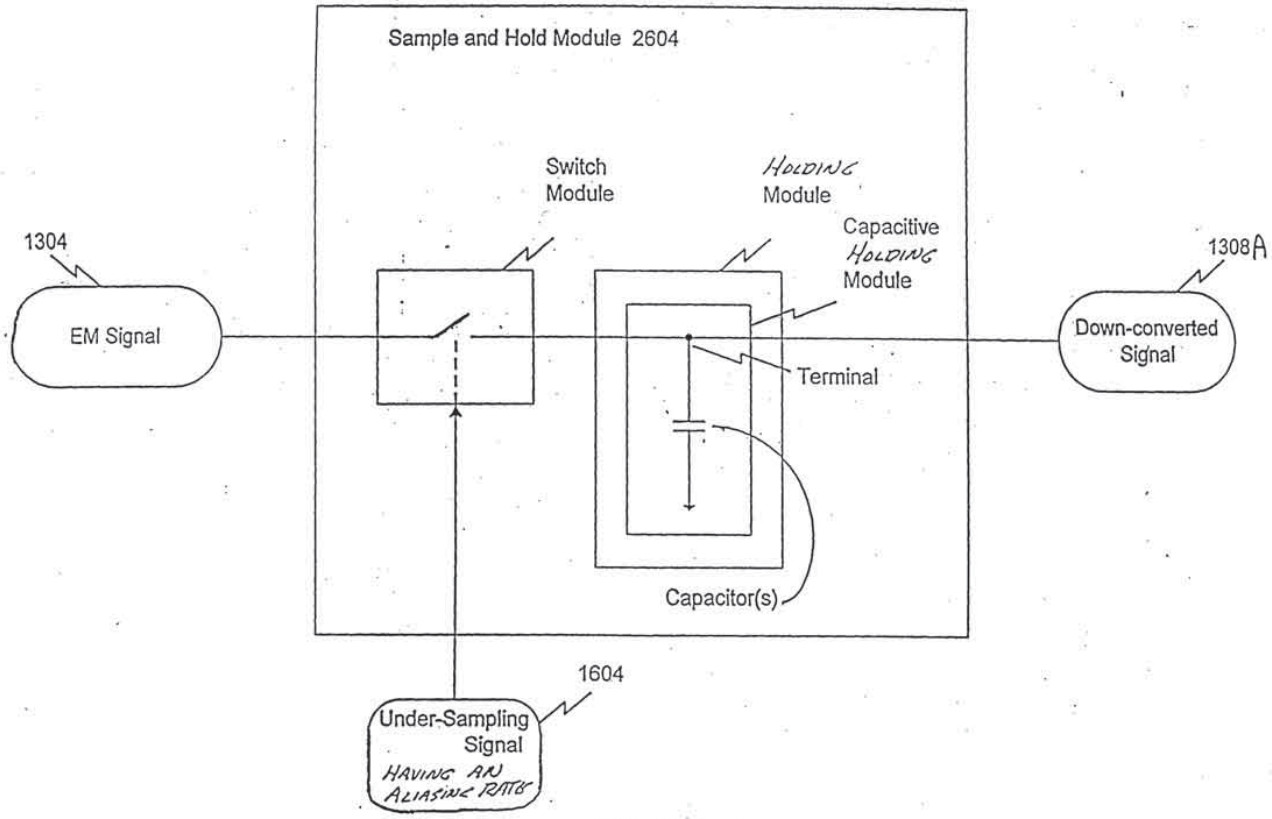
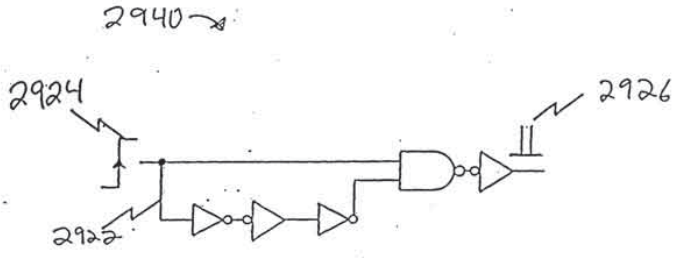


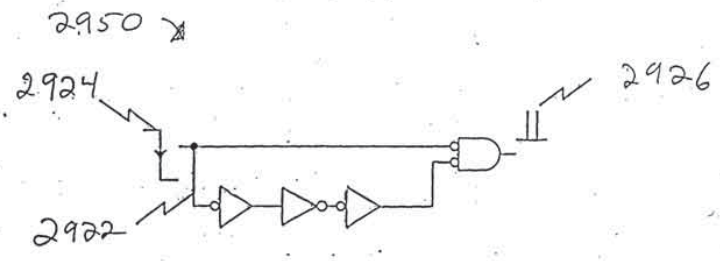
FIG. 29G

09521870.030900



A. rising edge pulse generator

FIG. 29H



B. falling-edge pulse generator

FIG. 29I

2920
Input Signal
2924
Delay
2922
Pulse
2926
Inverter
2928
U7
-substantial equivalence in logic only is necessary.
-U7 shown for polarity consistency with
ckt examples described elsewhere.

FIG 29

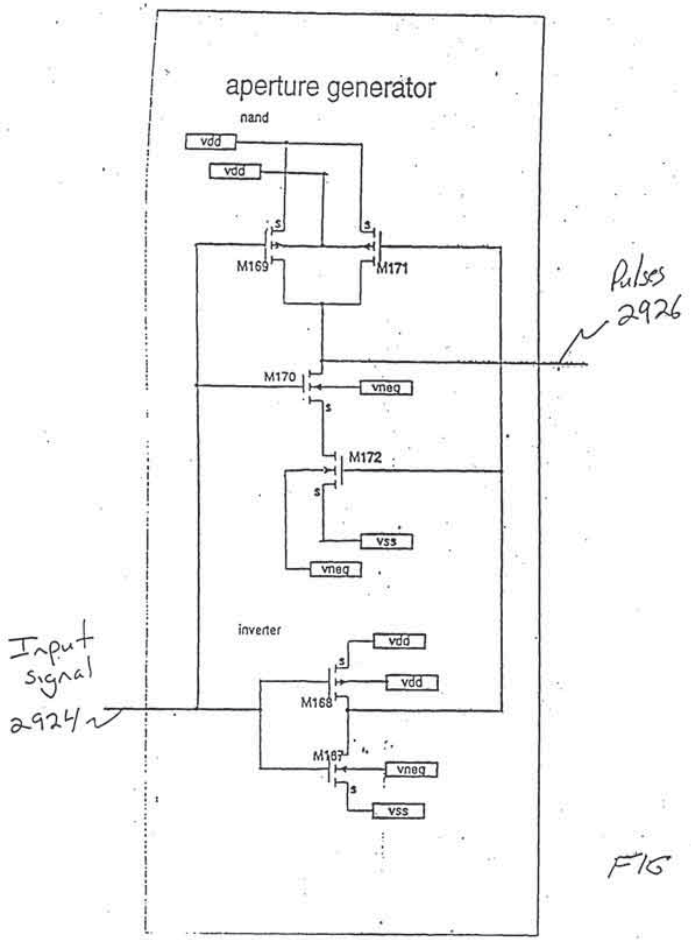
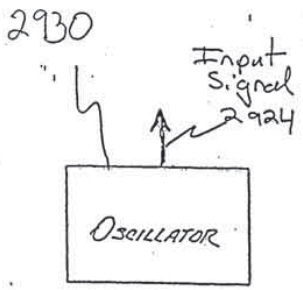


FIG 29K



29L

09521879.030900

3001
EM Signal
1304
Under-Sampling Module
1606
1604
Under-Sampling Signal
Down-converted Signal
1308A
3006
(OPTIONAL) FEEDBACK
(optional) Input signal
2926
Under-Sampling Signal Module
3002
(OPTIONAL)

FIG. 30

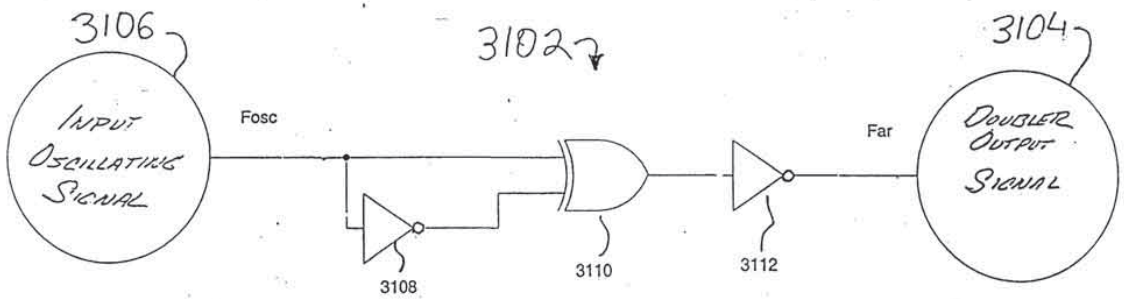

3106
3102
3104
Input Oscillating Signal
Fosc
Far
Doubler Output Signal
3108
3110
3112

FIG 31A

948

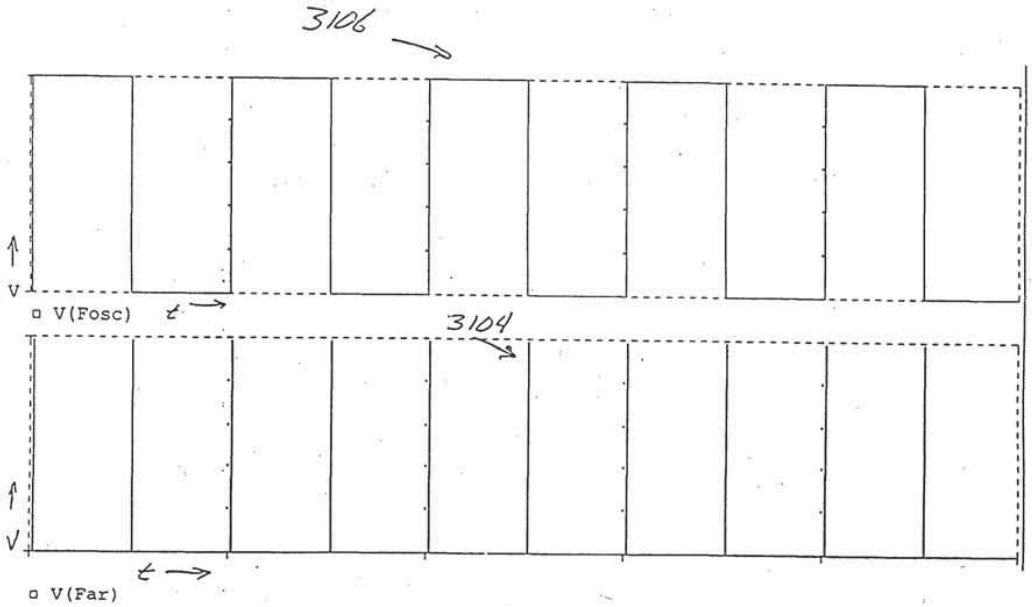


FIG 31B

FIG. 31C

FIG 31B-C

09521879.030900

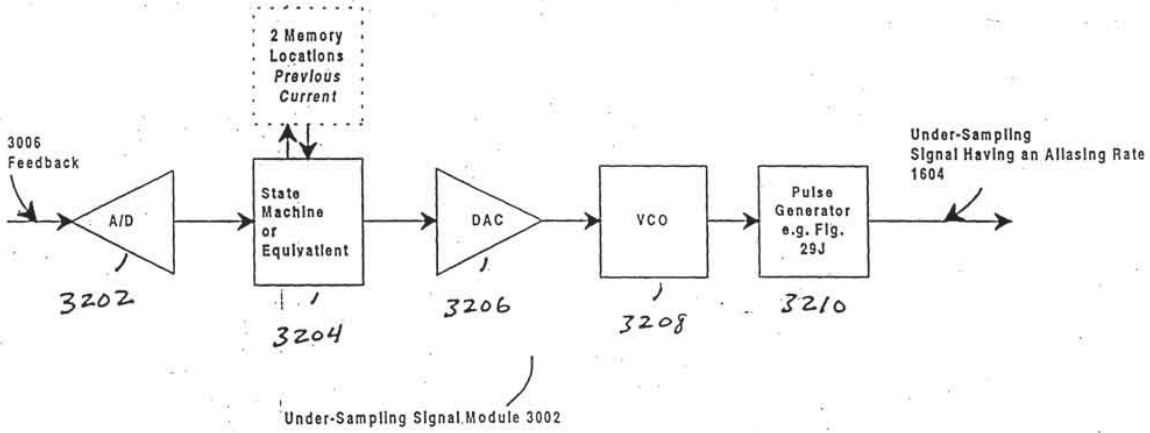
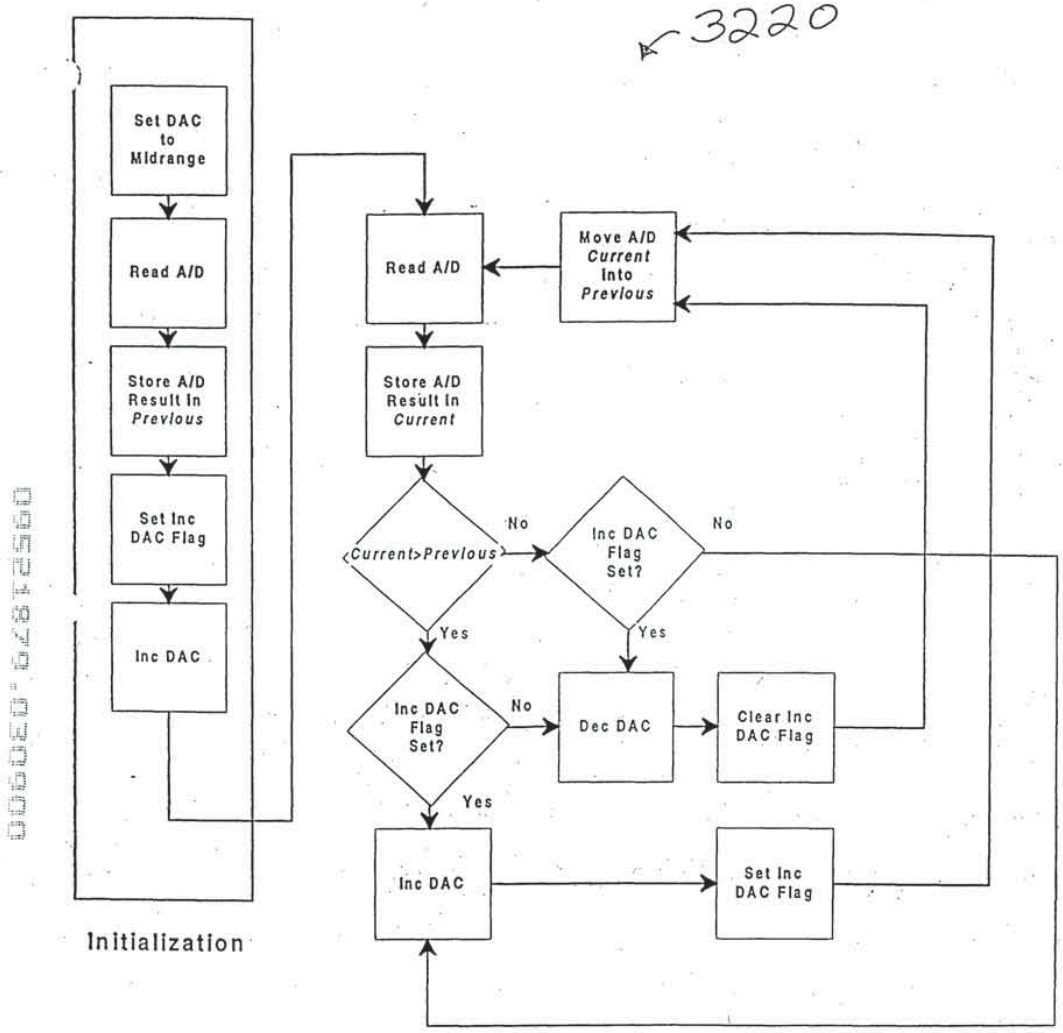
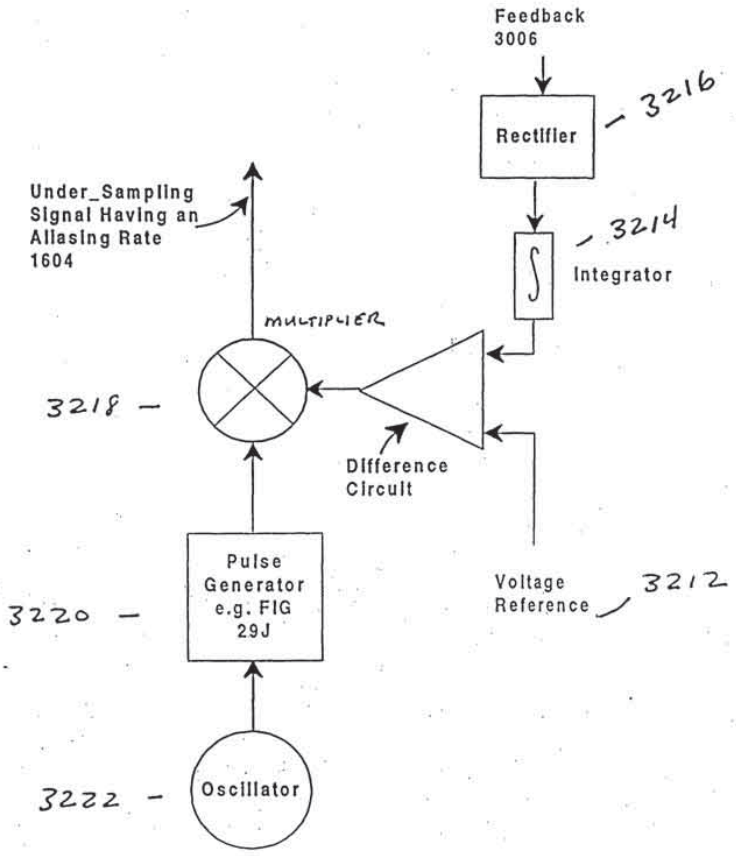

2 Memory Locations
Previous
Current
3006
Feedback
A/D
State Machine or Equivalent
DAC
VCO
Pulse Generator e.g. Fig. 29J
Under-Sampling Signal Having an Aliasing Rate 1604
3202
3204
3206
3208
3210
Under-Sampling Signal Module 3002

FIG 32A



State Machine Flowchart

FIG. 32B



Energy Transfer Signal Module 3002

FIG. 32C

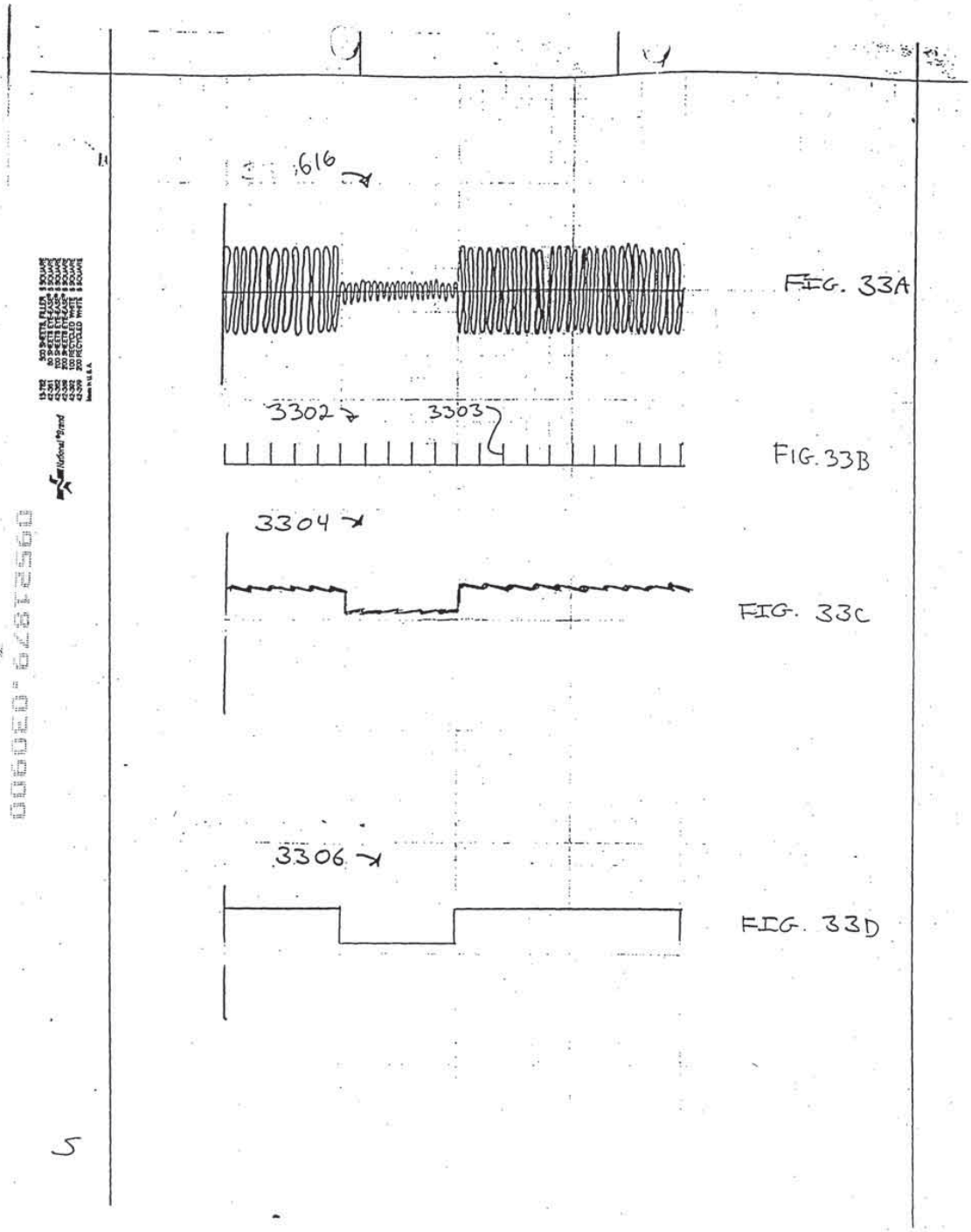


FIG. 33A

FIG. 33B

FIG. 33C

FIG. 33D

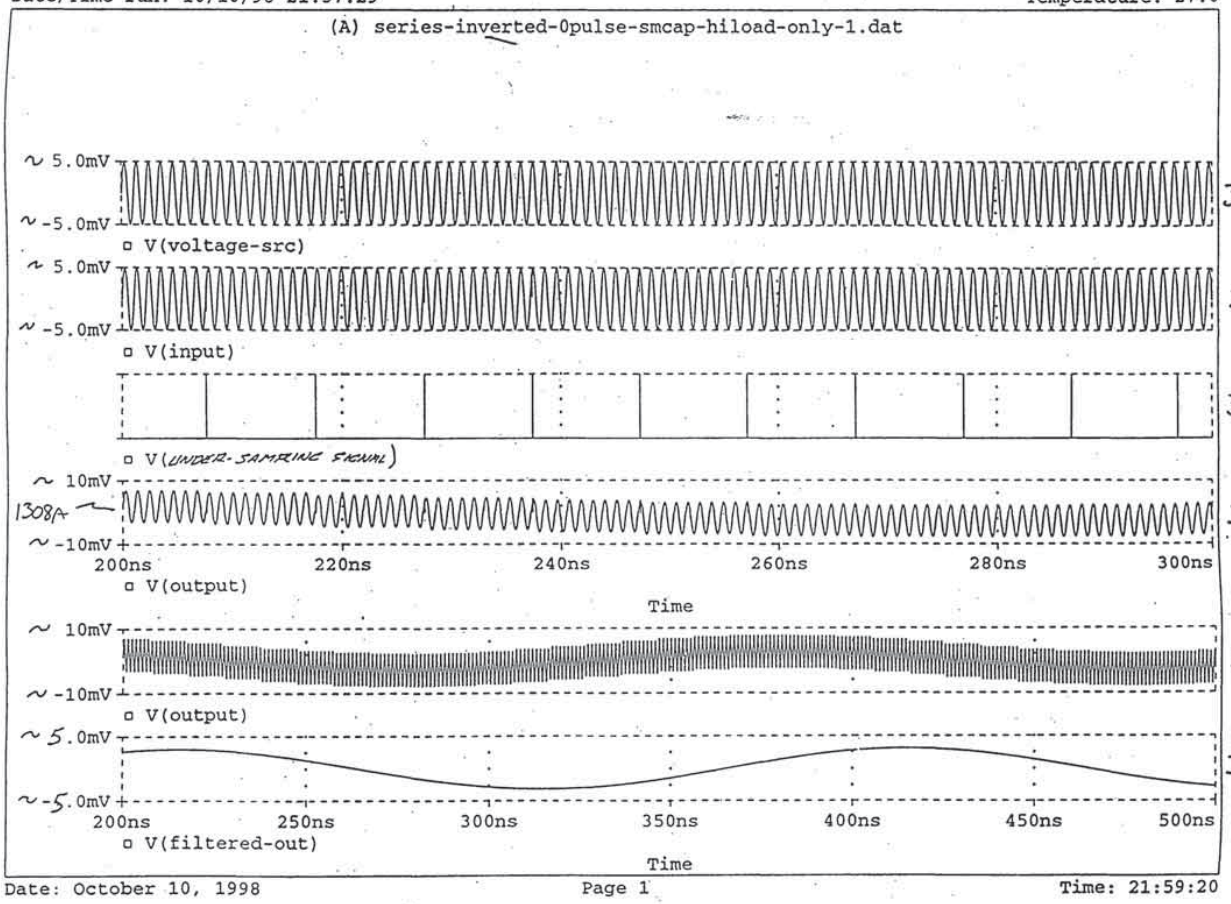


FIG 34

09521879.030900

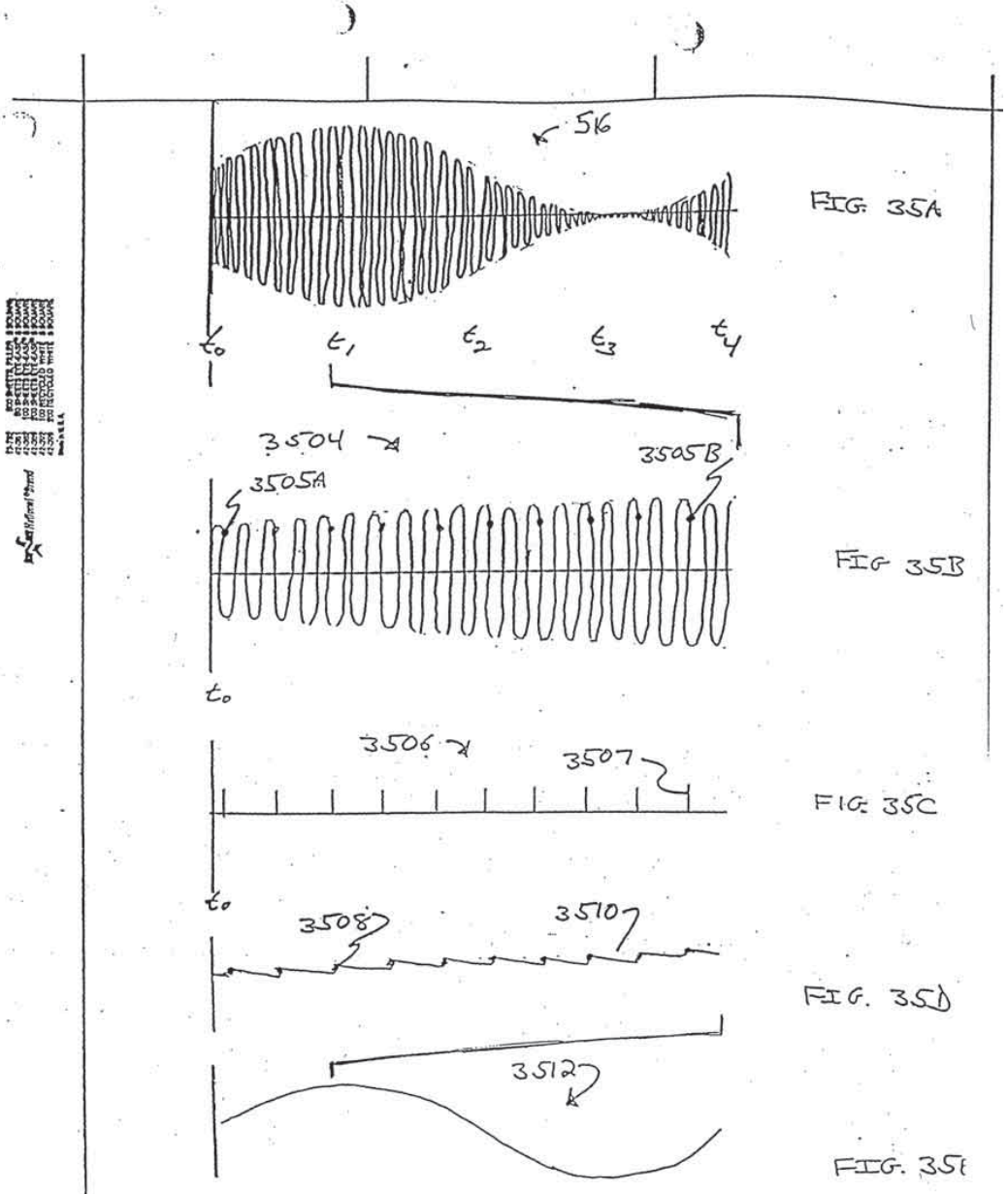


FIG. 35A

FIG. 35B

FIG. 35C

FIG. 35D

FIG. 35E

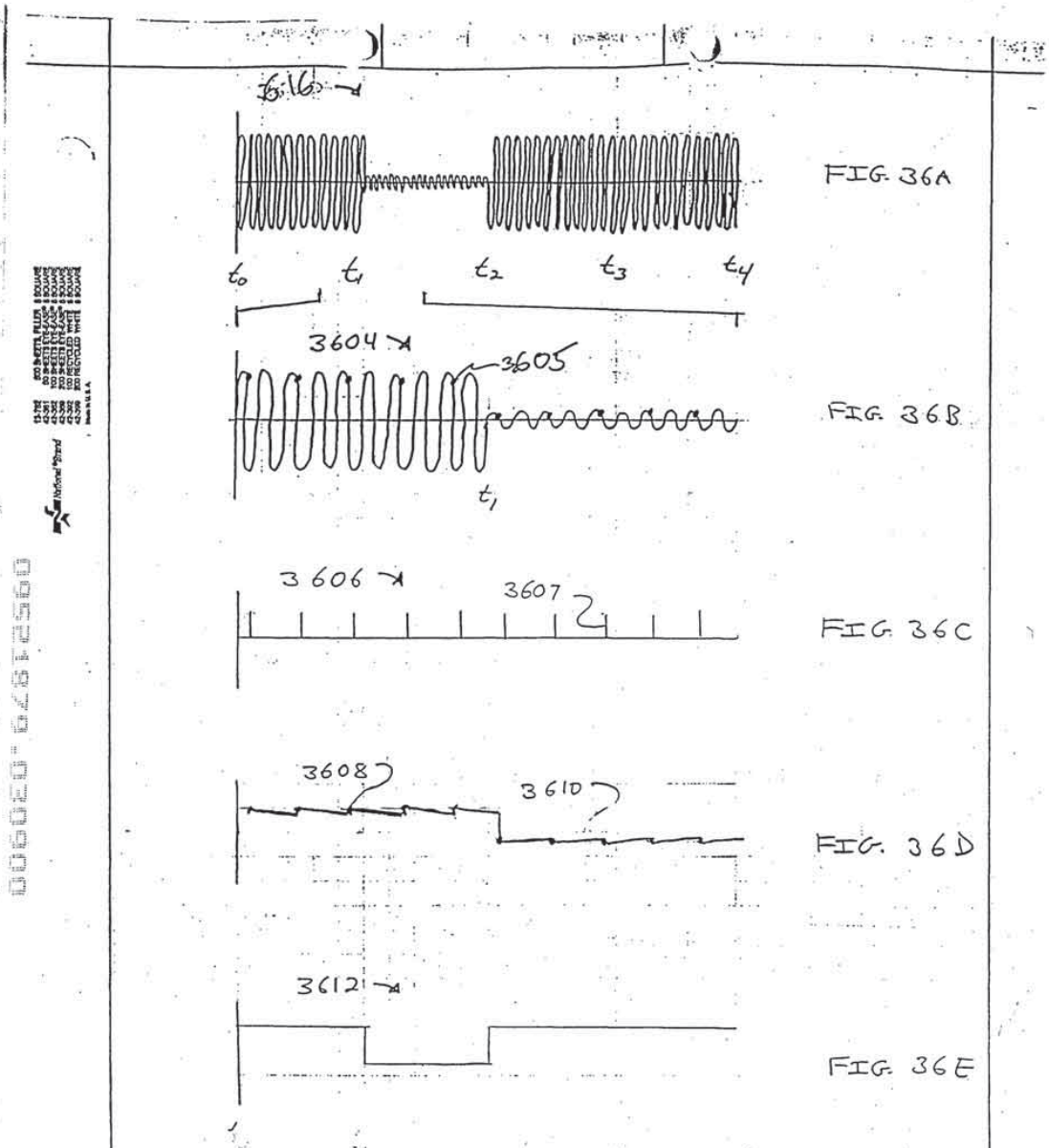


FIG. 36A

FIG. 36B

FIG. 36C

FIG. 36D

FIG. 36E

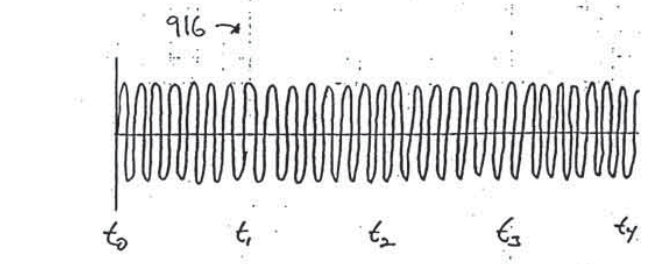


FIG. 37A

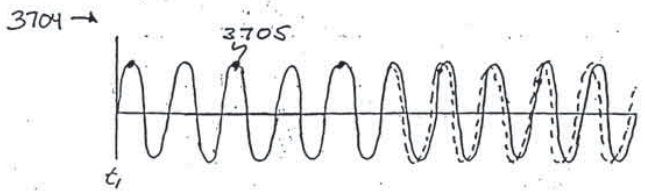


FIG. 37B

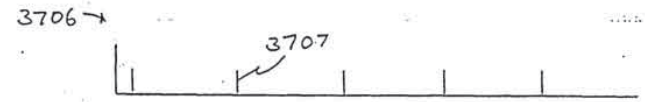


FIG. 37C

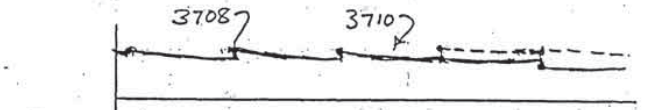


FIG. 37D

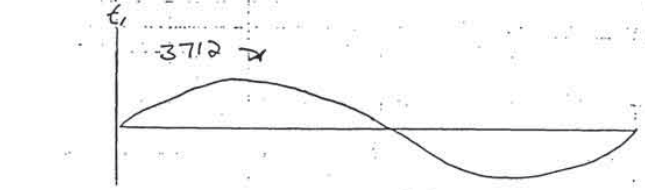


FIG. 37E

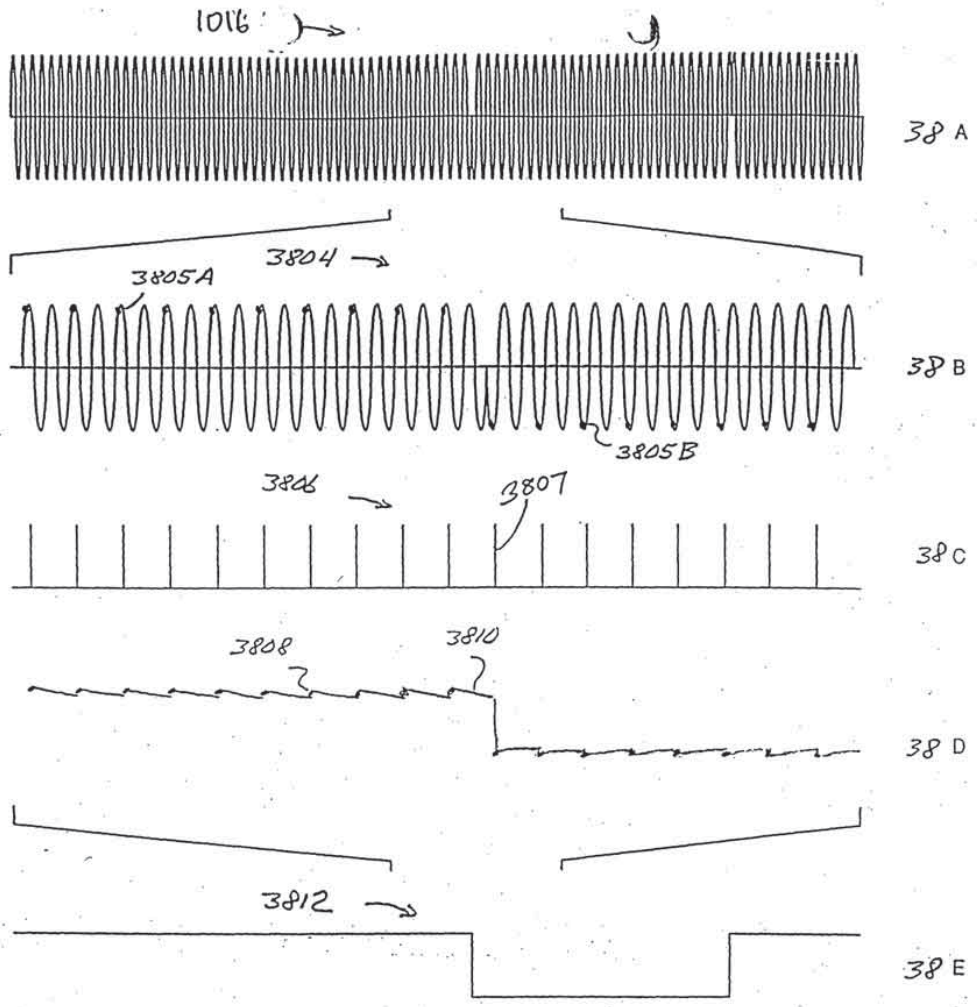

1016
38 A
3804
3805A
38 B
3805B
3806
3807
38 C
3808
3810
38 D
3812
38 E

FIG 38AE

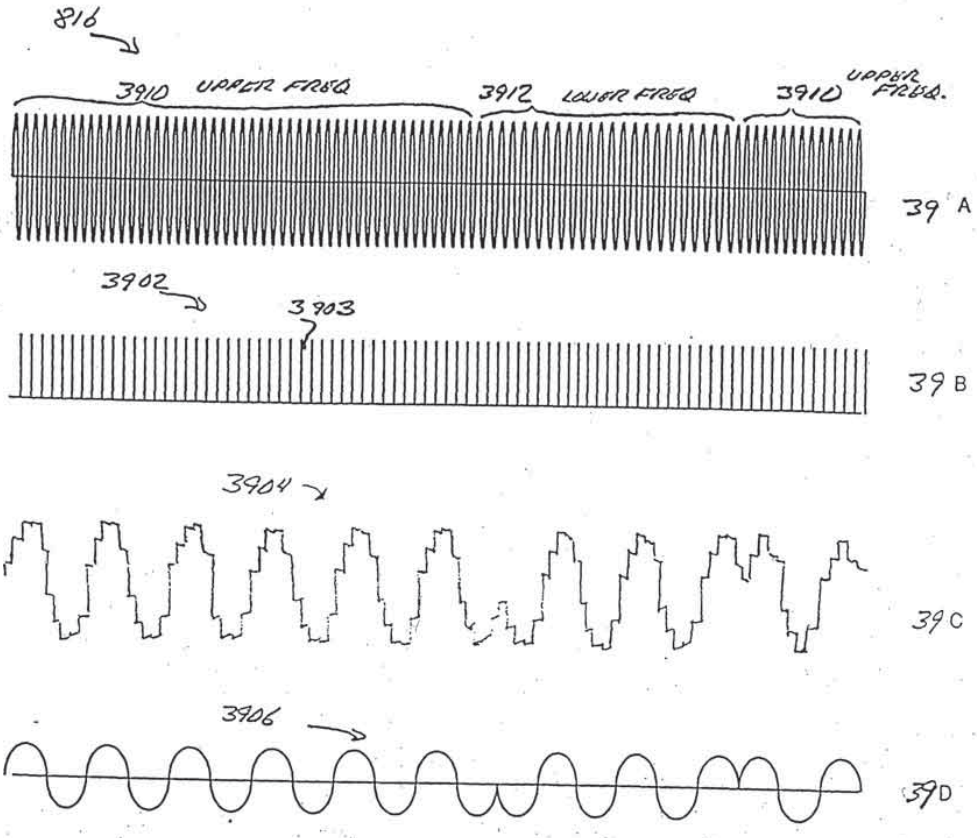

816
3910 UPPER FREQ
3912 LOWER FREQ
3910 UPPER FREQ.
39A
3902
3903
39B
3904
39C
3906
39D

FIG 39A-D

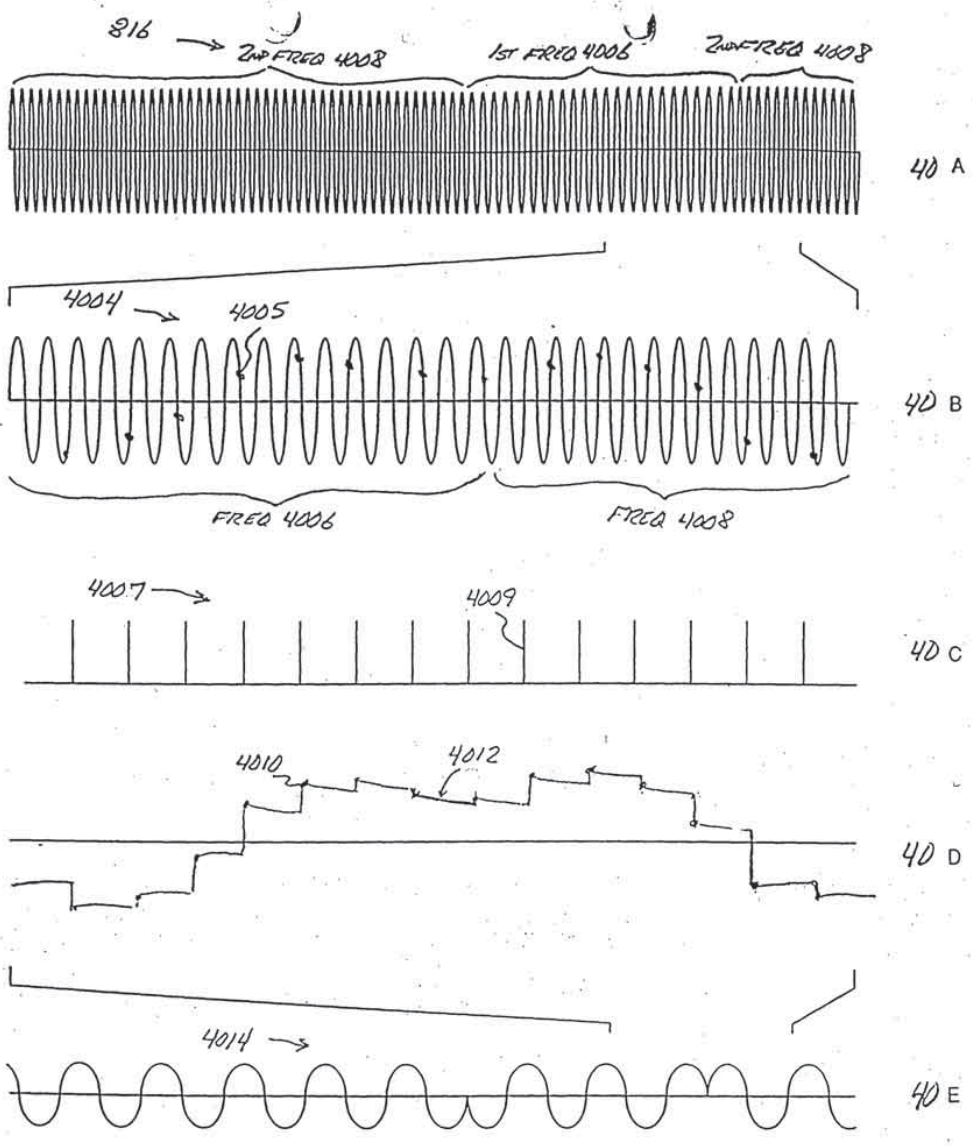

816
2ND FREQ 4008
1ST FREQ 4006
2ND FREQ 4008
40 A
4004
4005
40 B
FREQ 4006
FREQ 4008
4007
4009
40 C
4010
4012
40 D
4014
40 E

FIG 40A-E

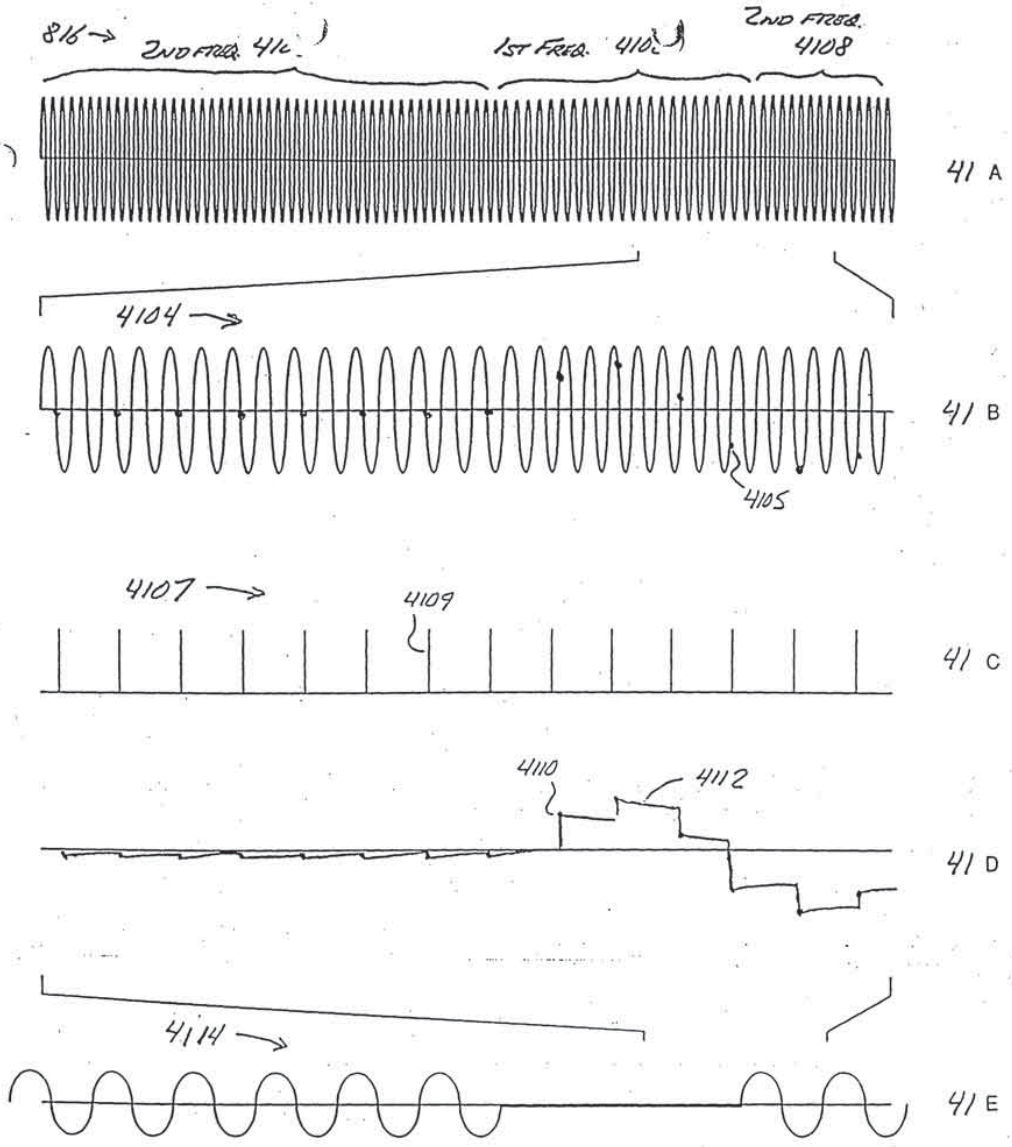

816 →
2ND FREQ. 411c
1ST FREQ. 410c
2ND FREQ. 4108
41 A
4104 →
41 B
4105
4107 →
4109
41 C
4110
4112
41 D
4114 →
41 E

FIG 41 A-E

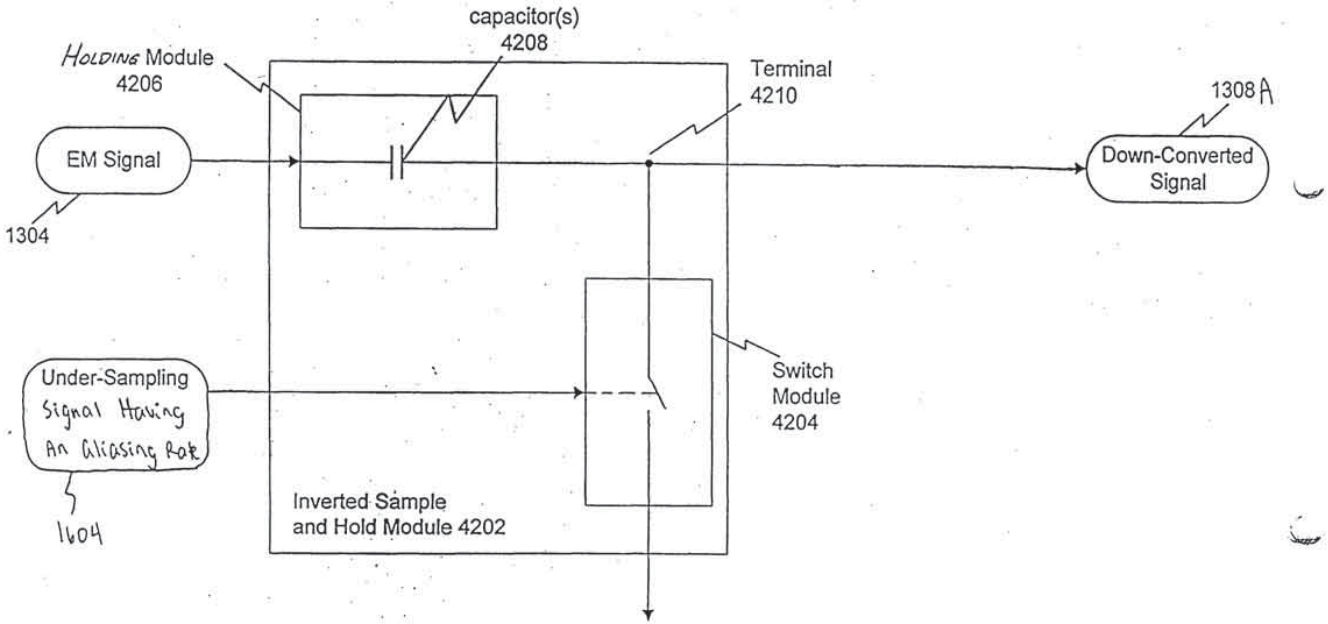


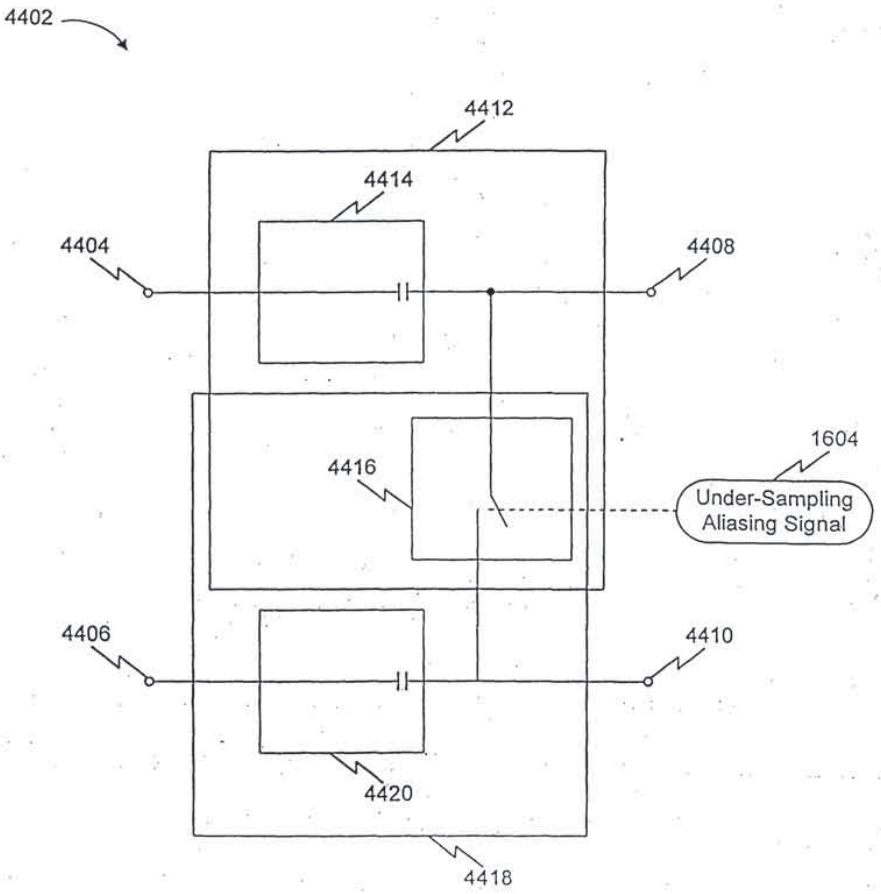
FIG. 42

09521879.030900

$$\Delta q(t) = 2 \cdot C \cdot A \cdot \sin\left(\frac{1}{2} \cdot T\right) \cdot \cos\left(t - \frac{1}{2} \cdot T\right)$$

FIG. 43

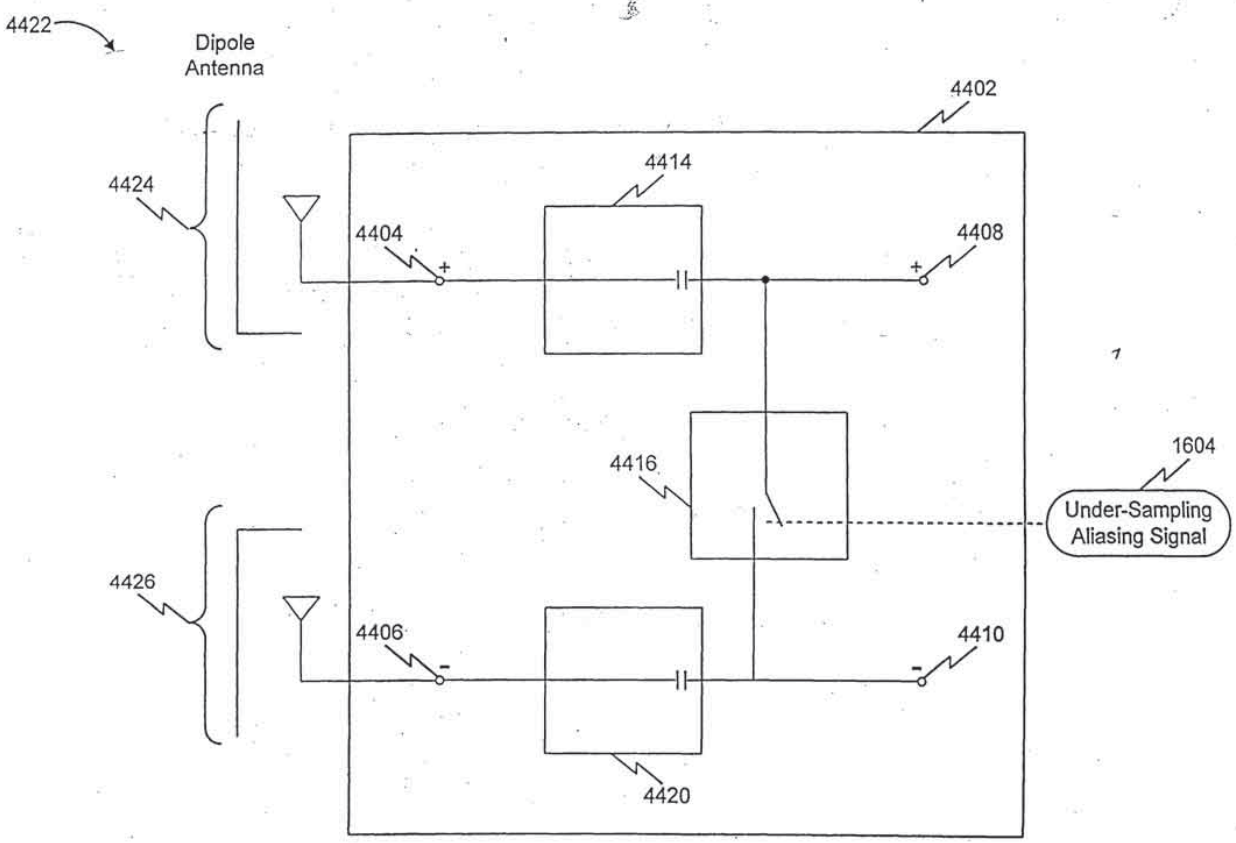
09521879.030900



Differential Configuration

FIG. 44A

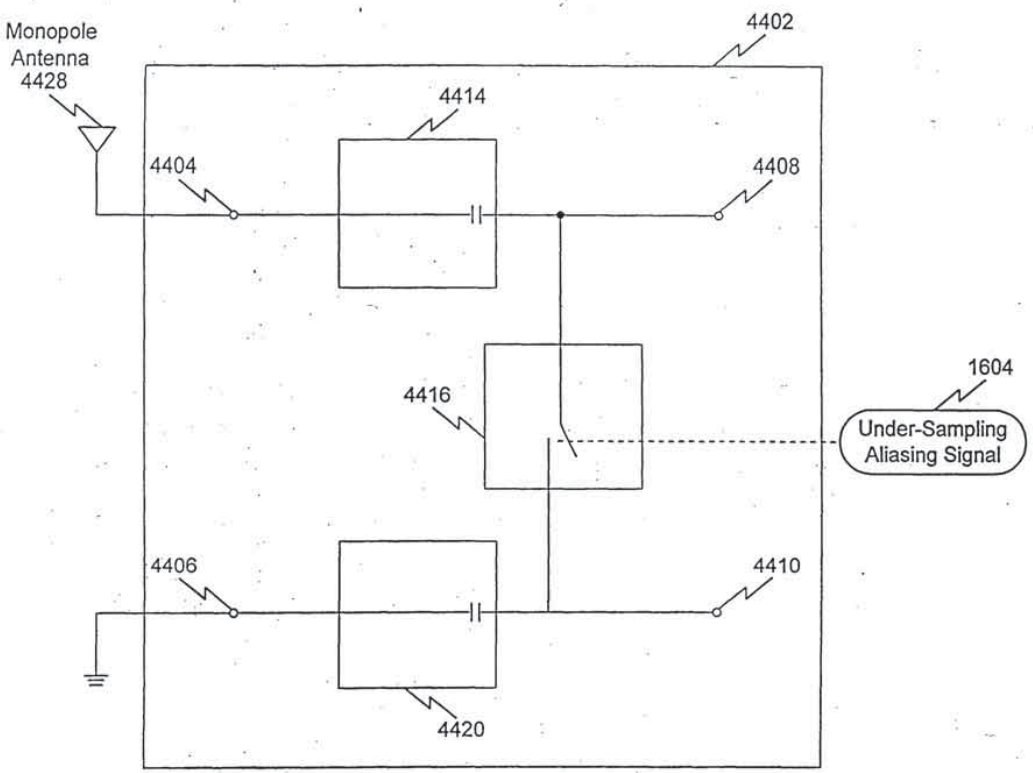
9807-10.vsd/22



Differential Input to Differential Output

FIG. 44B

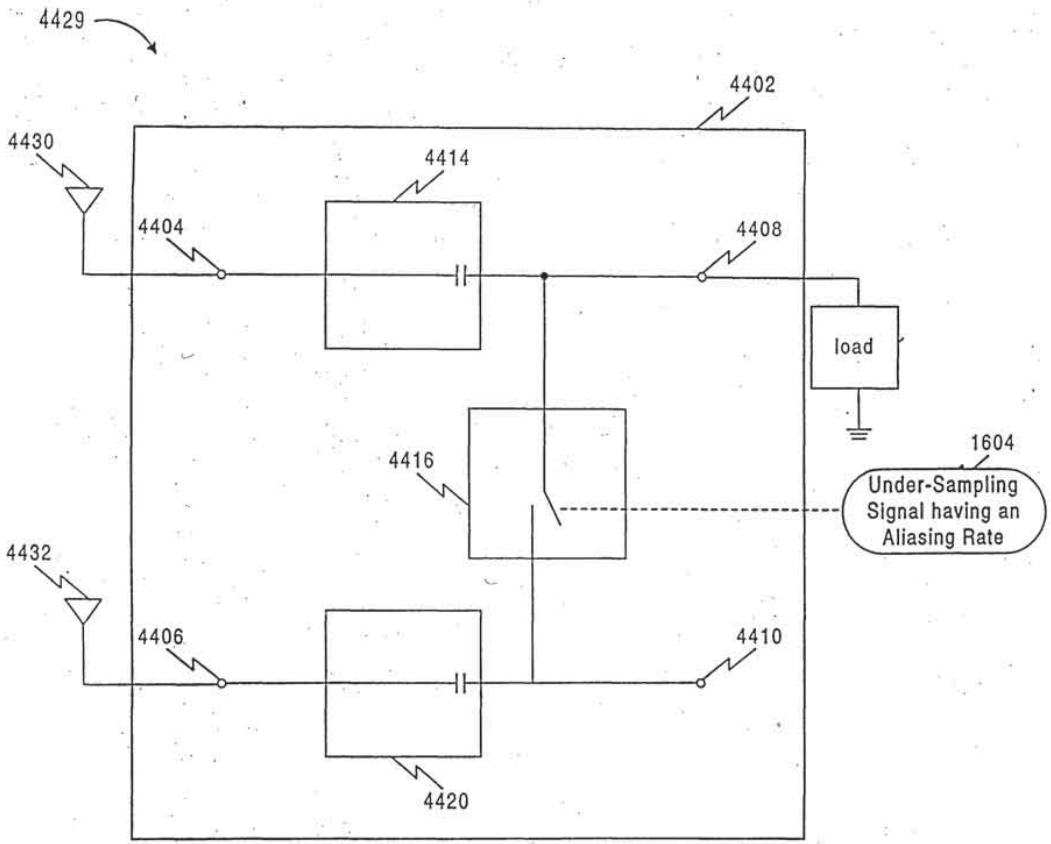
9807-10.vsd/23



Single Input to Differential Output

FIG. 44C

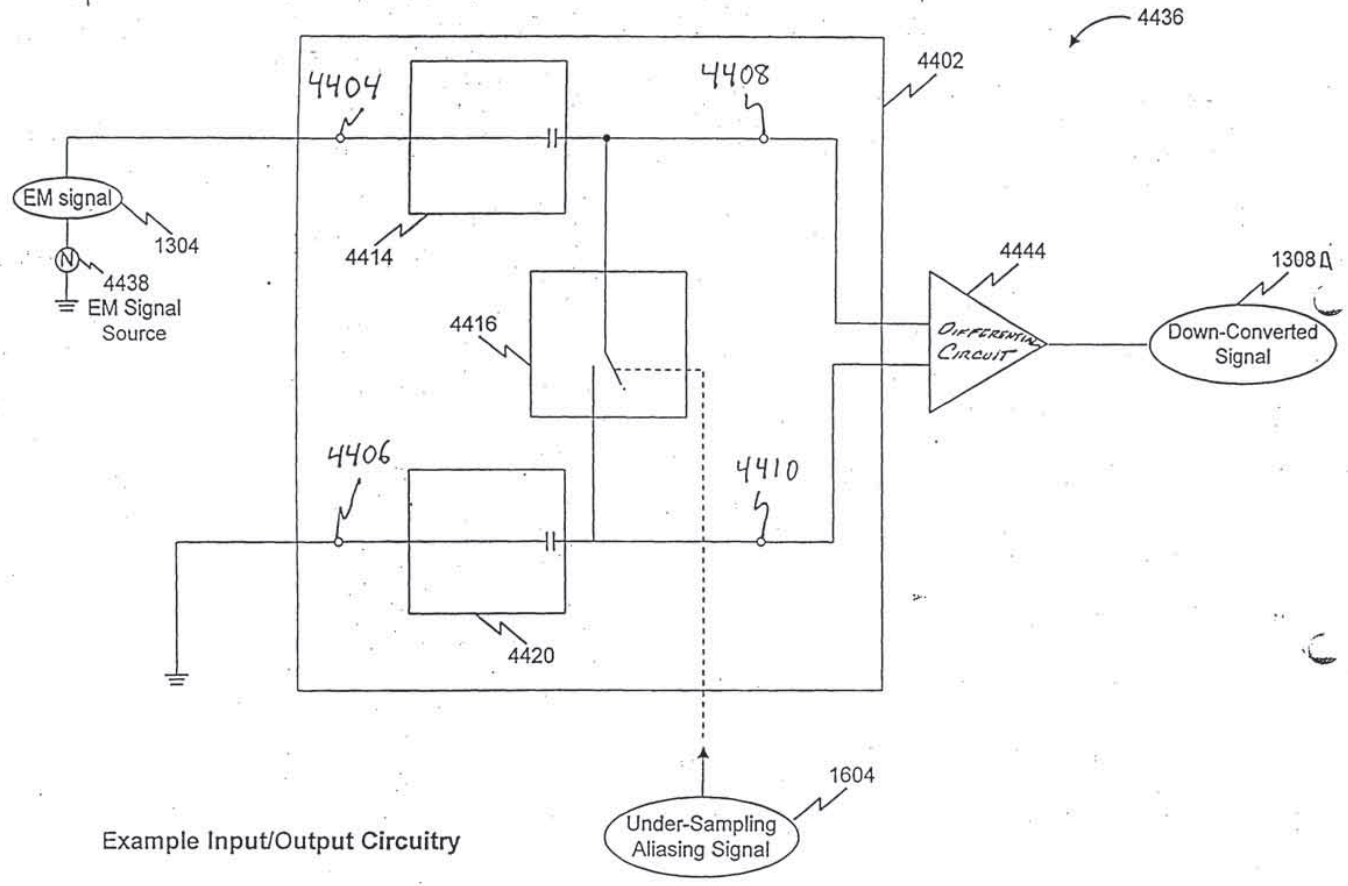
09521879.030900



Differential Input to Single Output

FIG. 44D

09521879.030900



Example Input/Output Circuitry

FIG. 44E

09521879.030900

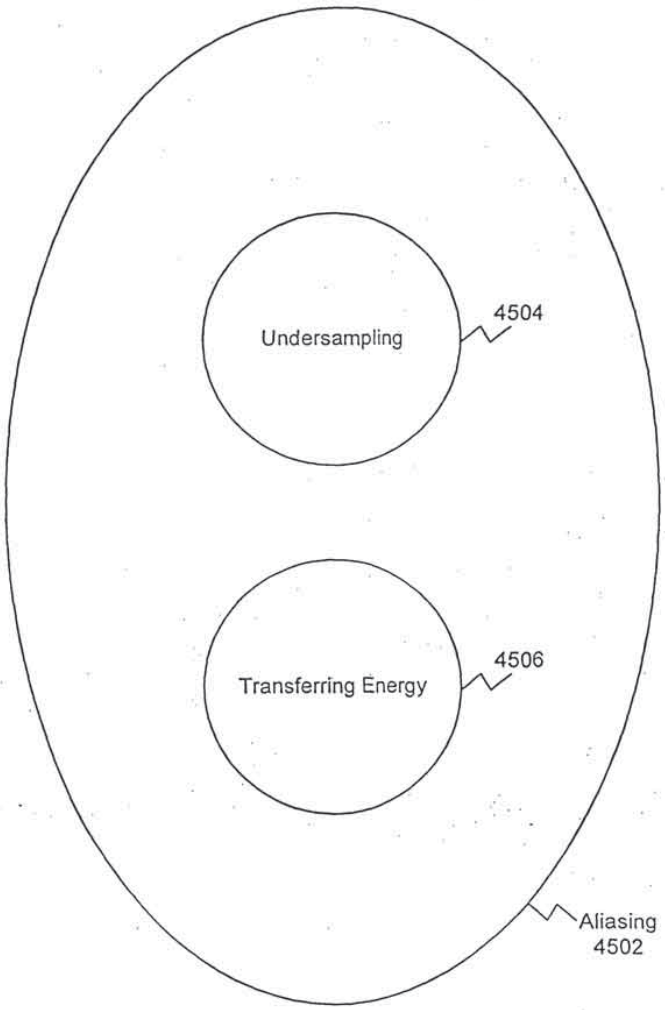

Undersampling
4504
Transferring Energy
4506
Aliasing
4502

FIG. 45A

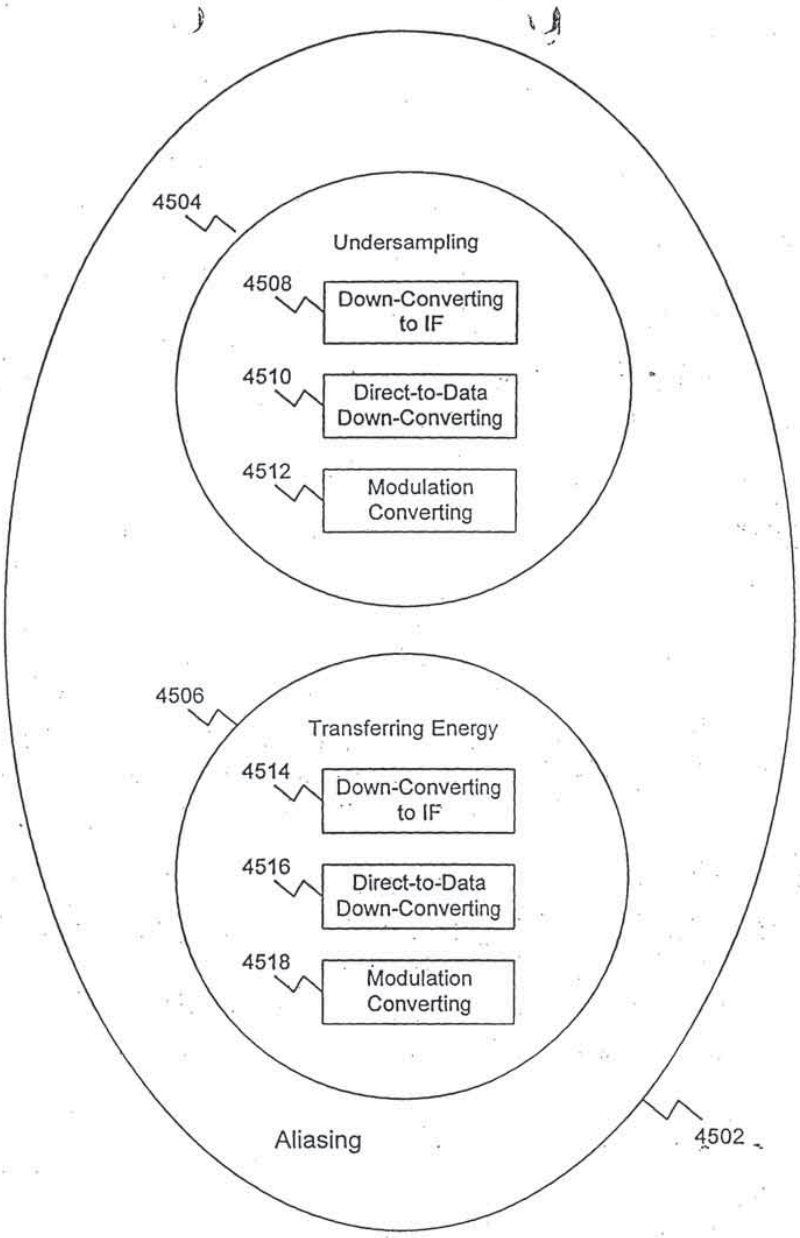

4504
Undersampling
4508
Down-Converting to IF
4510
Direct-to-Data Down-Converting
4512
Modulation Converting
4506
Transferring Energy
4514
Down-Converting to IF
4516
Direct-to-Data Down-Converting
4518
Modulation Converting
Aliasing
4502

FIG. 45B

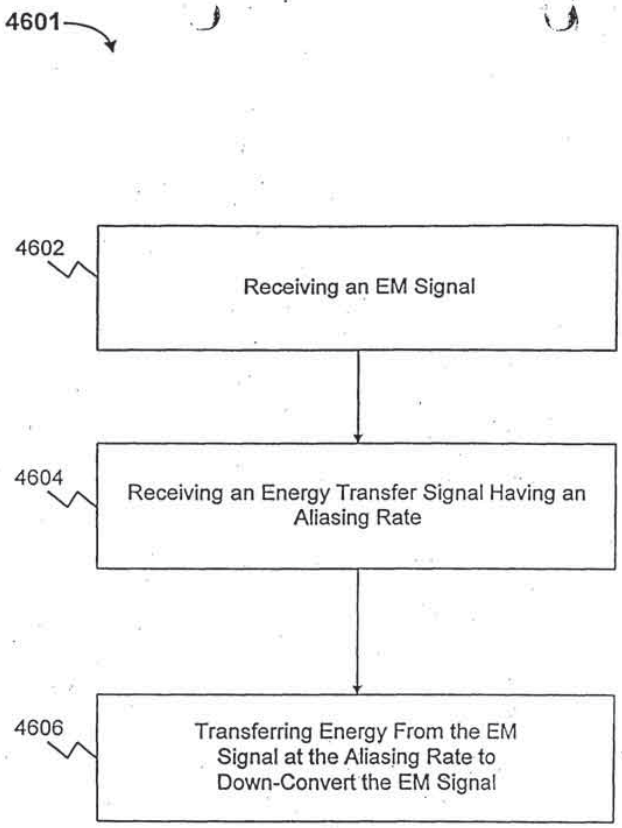


FIG. 46A

9807-09.vsd/12

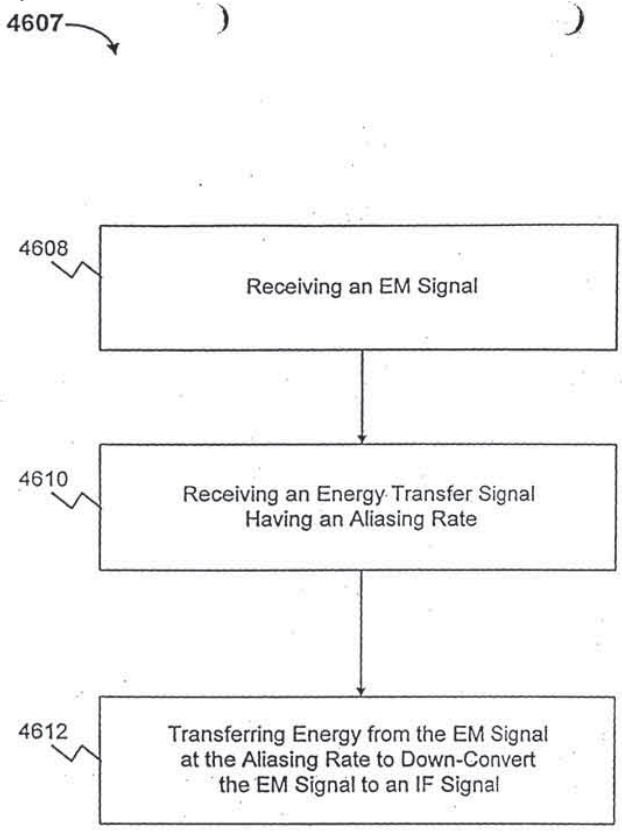


FIG. 46B

9807-09.vsd/13

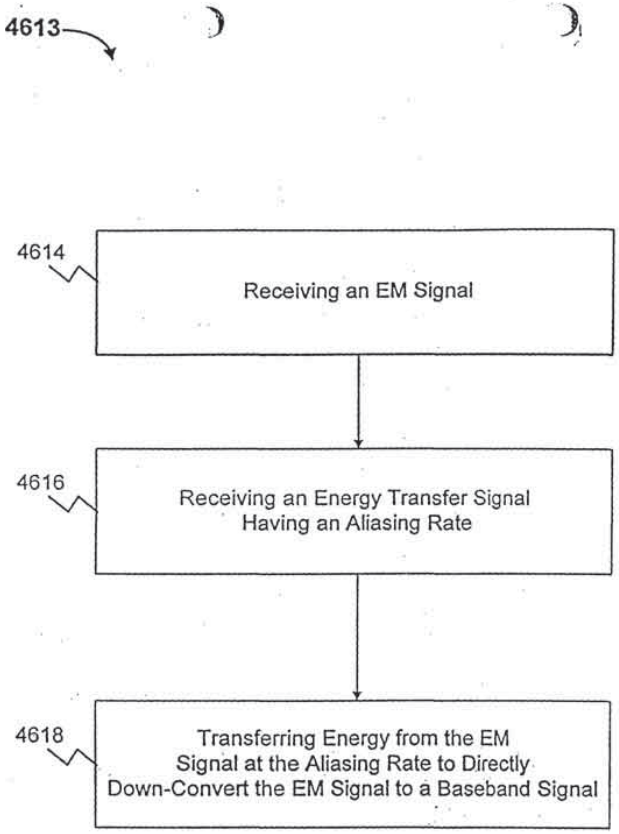


FIG. 46C

9807-09.vsd/14

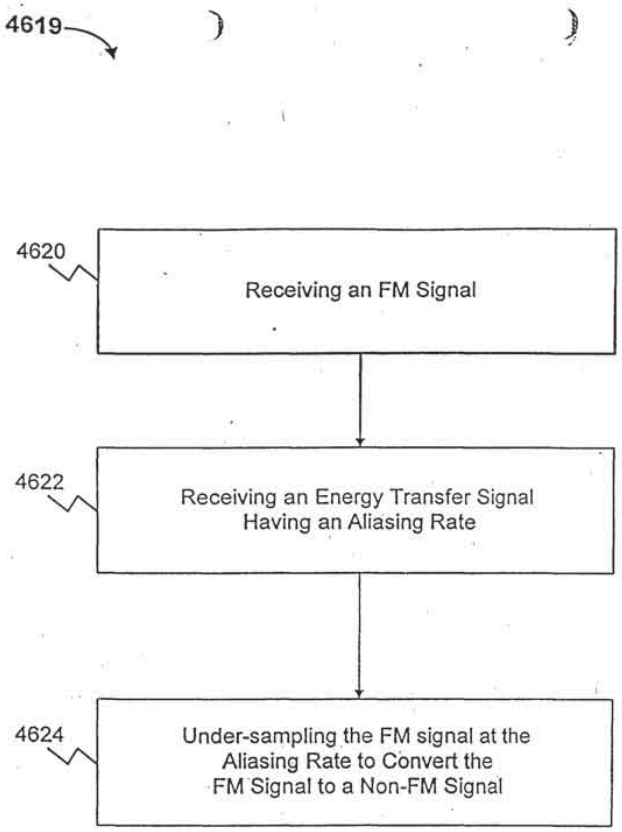


FIG. 46D

5

9807-09.vsd/15

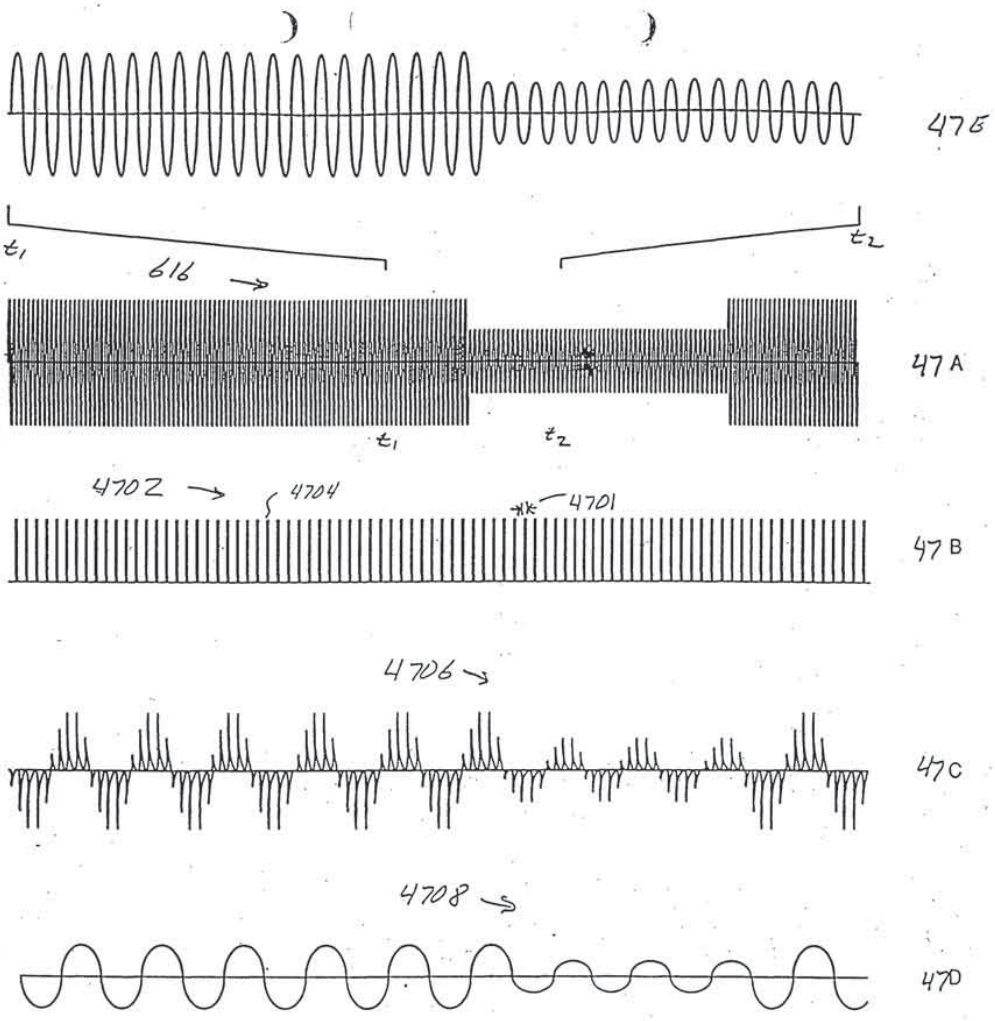


FIG 47A-E

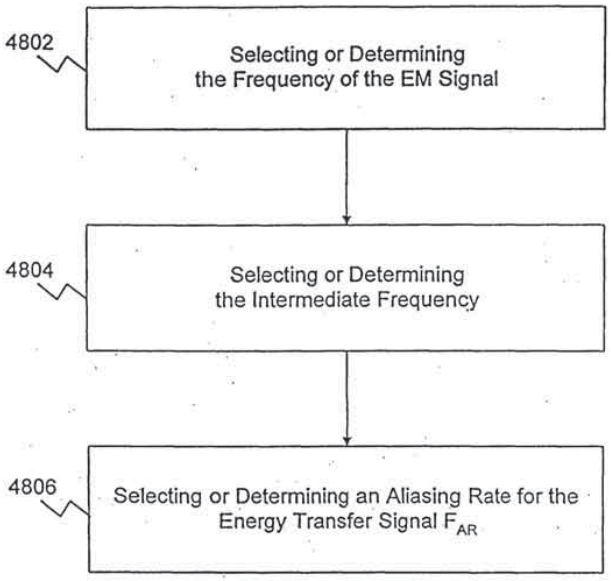


FIG. 48

5

9807-09.vsd/16

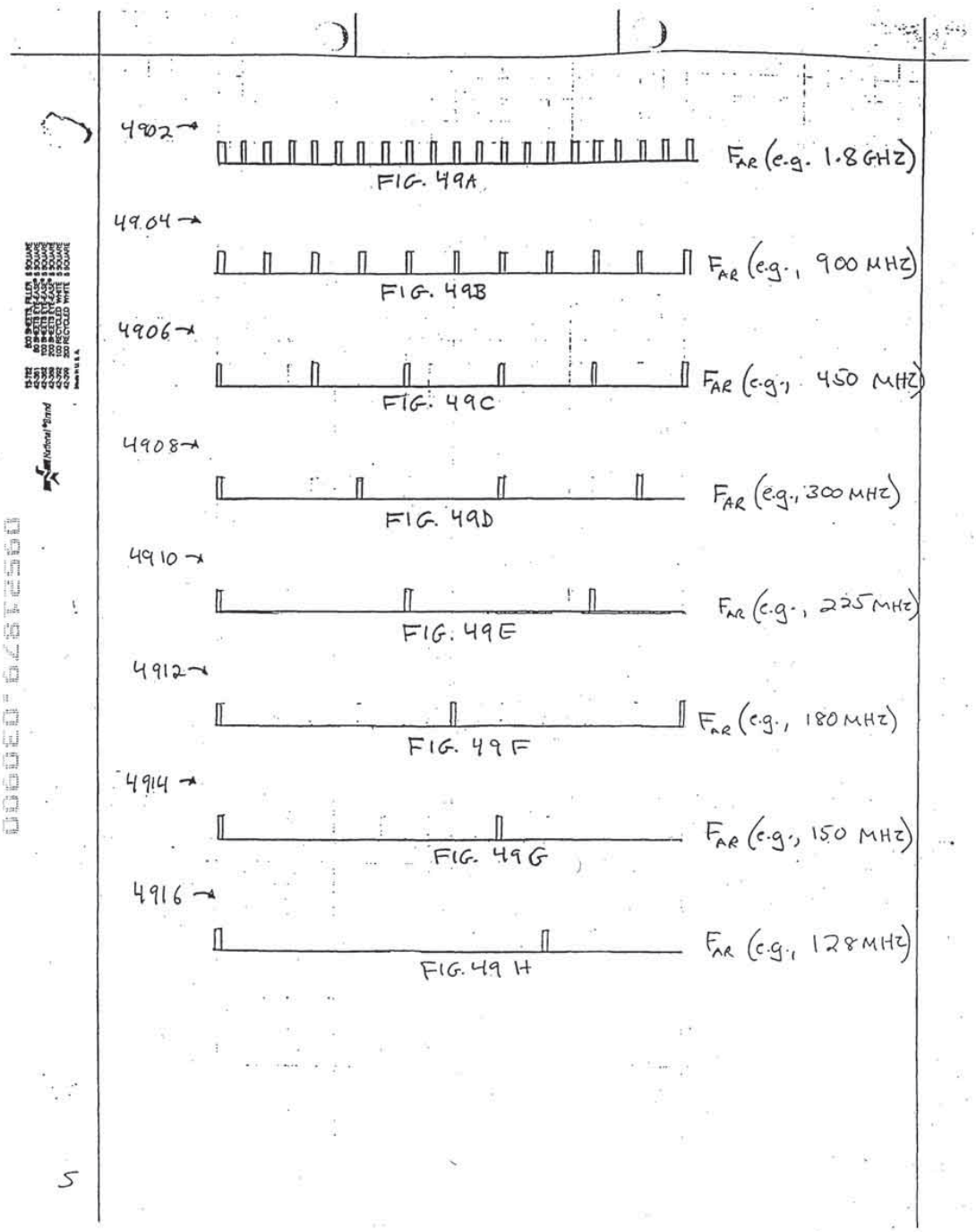


FIG. 49A

FIG. 49B

FIG. 49C

FIG. 49D

FIG. 49E

FIG. 49F

FIG. 49G

FIG. 49H

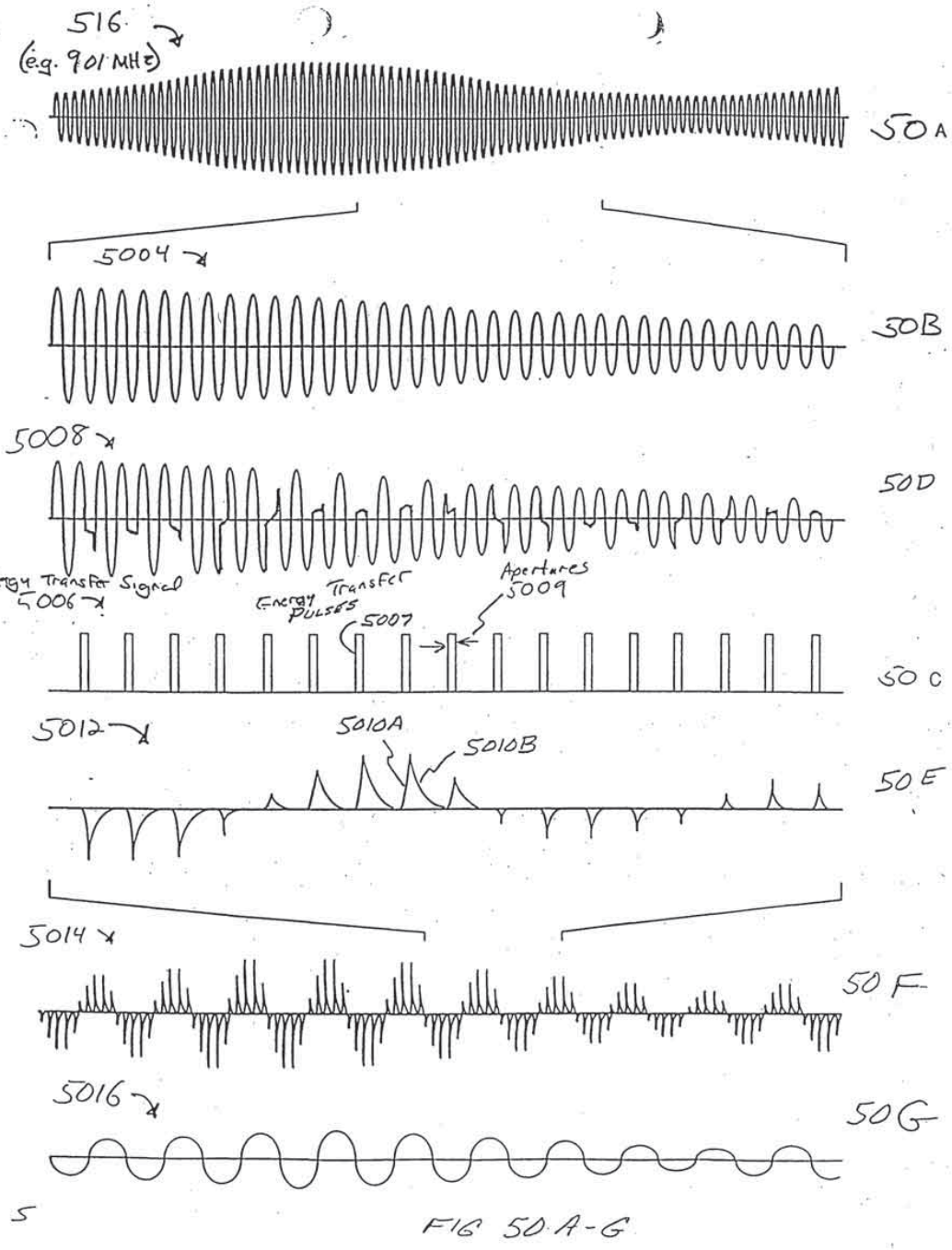

516
(e.g. 901 MHz)
50A
5004
50B
5008
50D
Energy Transfer Signal
5006
Energy Transfer Pulses
5007
Apertures
5009
50C
5012
5010A
5010B
50E
5014
50F
5016
50G

FIG 50 A-G

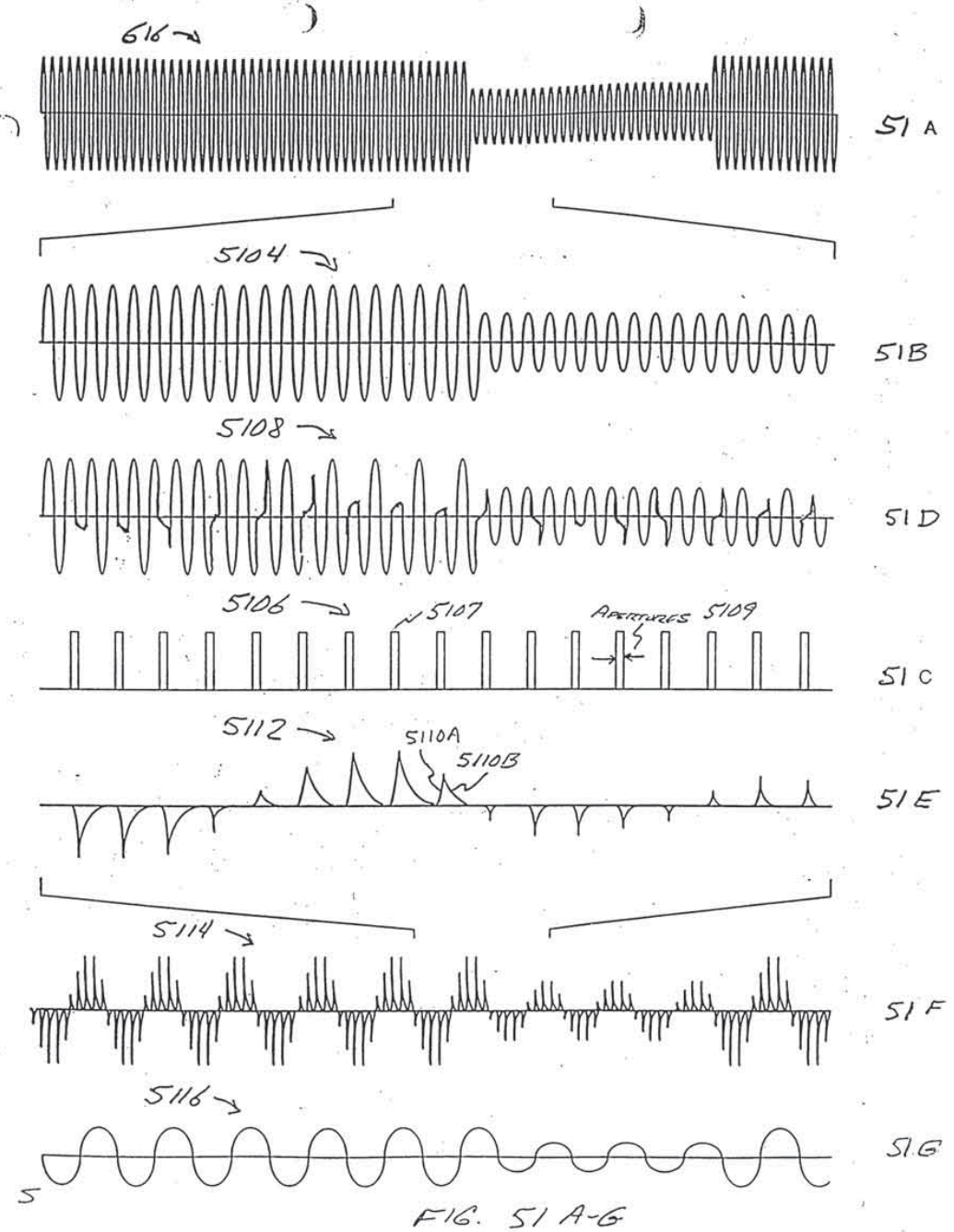

616
51A
5104
51B
5108
51D
5106
5107
APERTURES 5109
51C
5112
5110A
5110B
51E
5114
51F
5116
51G
S

FIG. 51 A-G

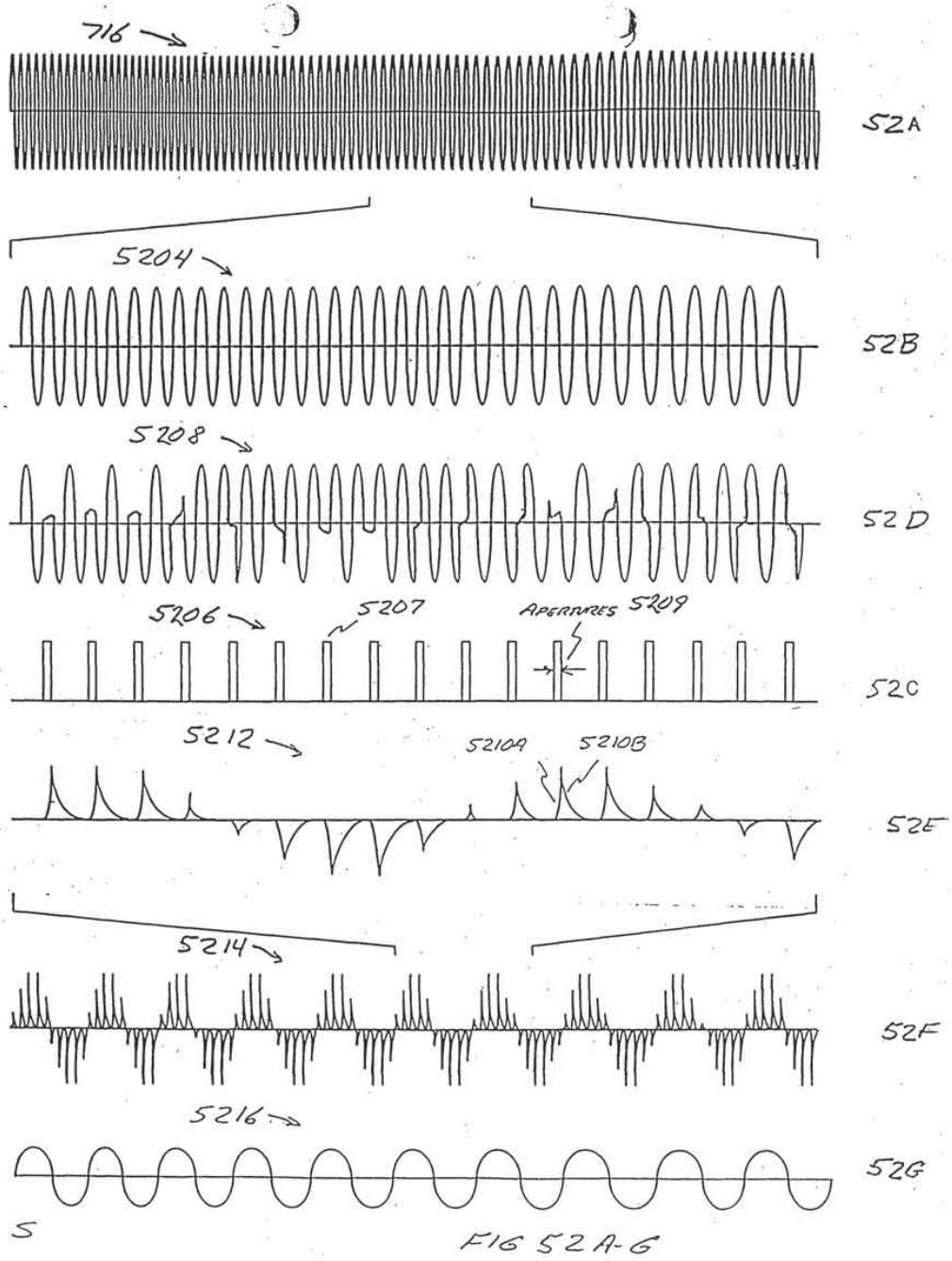


FIG 52A-G

US8020095B2

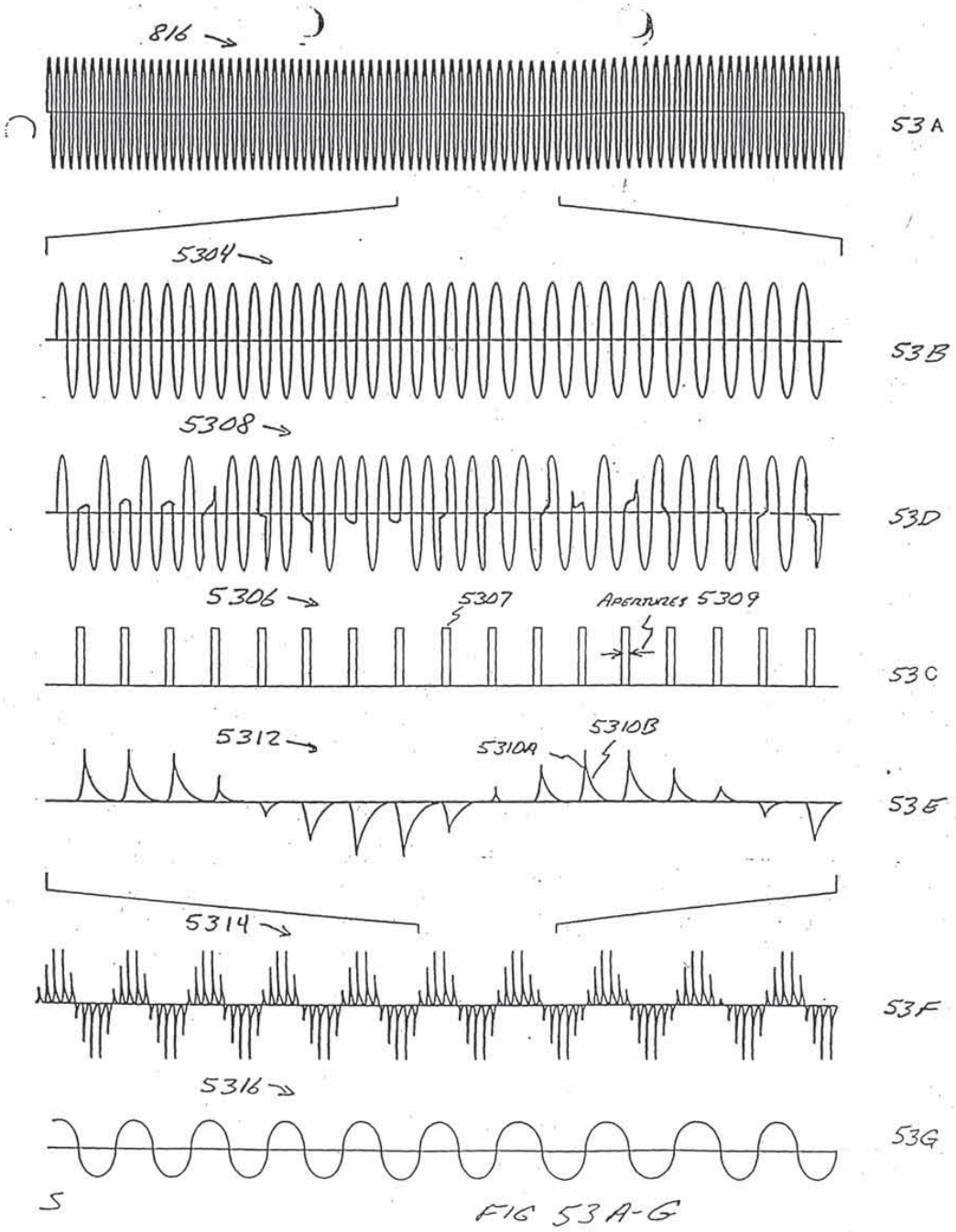

816
53A
5304
53B
5308
53D
5306
5307
APERTURES 5309
53C
5312
5310A
5310B
53E
5314
53F
5316
53G
S

FIG 53A-G

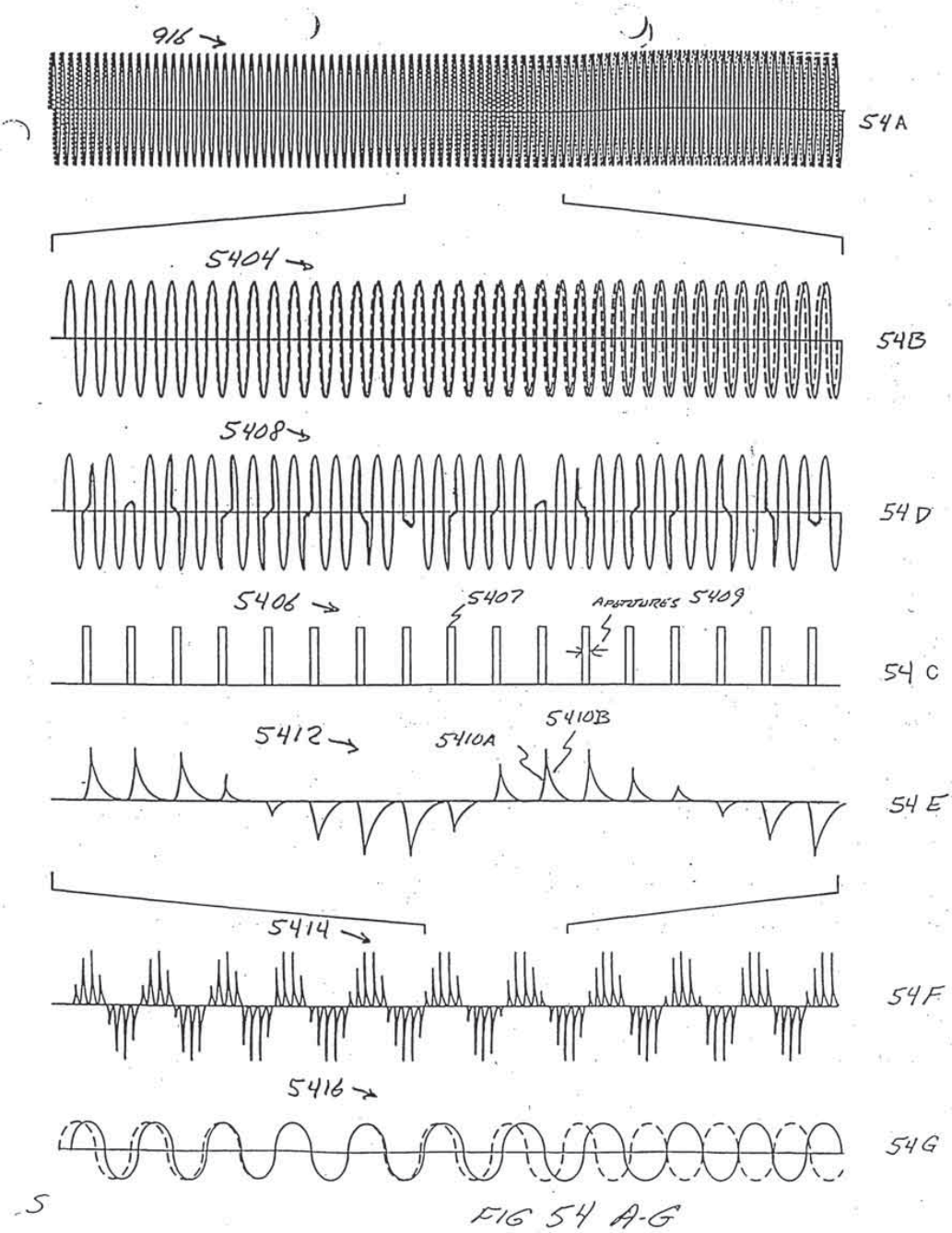

916
54A
5404
54B
5408
54D
5406
5407
APERTURES 5409
54C
5412
5410A
5410B
54E
5414
54F
5416
54G

FIG 54 A-G

FIG 55A-G
55A
55B
55C
55D
55E
55F
55G
S
10101
5504
5506
5507
APERTURES 5509
5508
5510A
5510B
5512
5514
5516

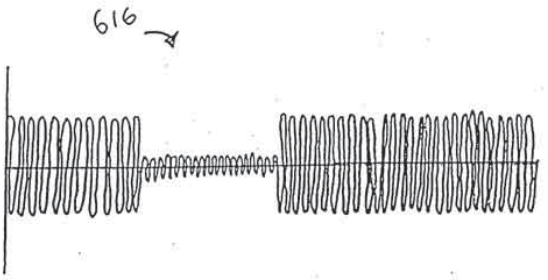


FIG. 56 A



FIG. 56 B

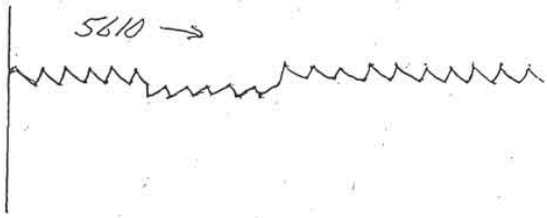


FIG. 56 C

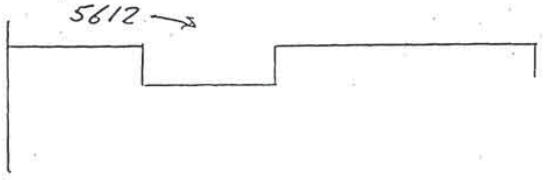


FIG. 56 D

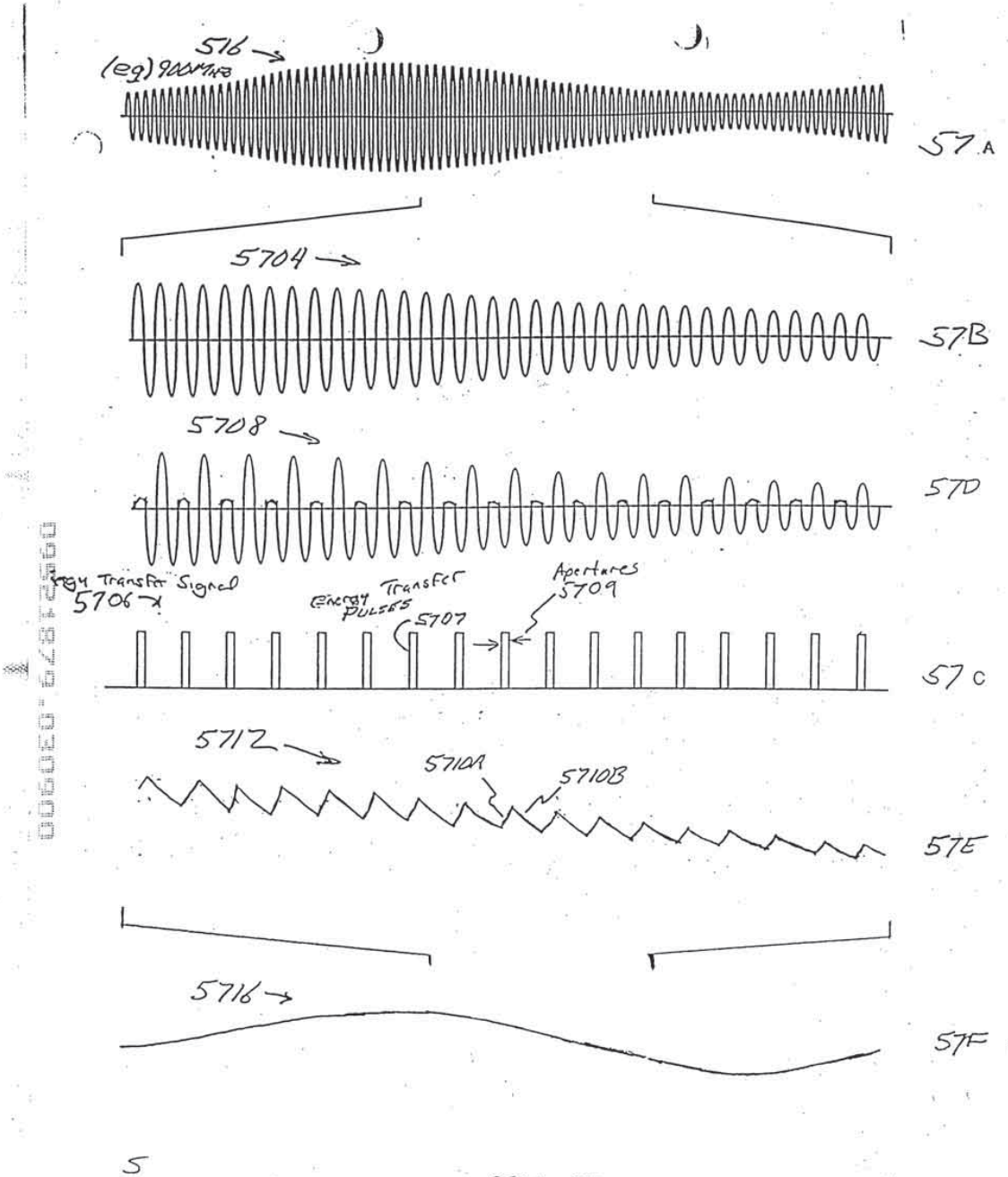

516
(eg) 900MHz
57A
5704
57B
5708
57D
Energy Transfer Signal
5706
Energy Transfer Pulses
5707
Apertures
5709
57C
5712
5710A
5710B
57E
5716
57F

FIG 57 A-F

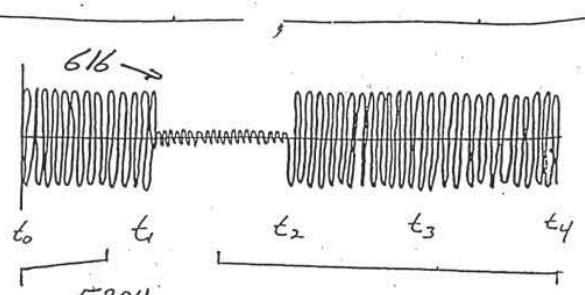


FIG. 58A

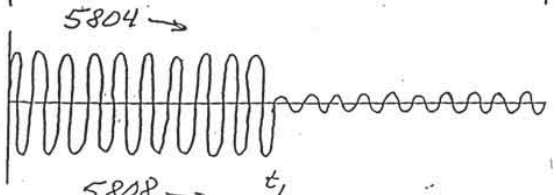


FIG. 58B

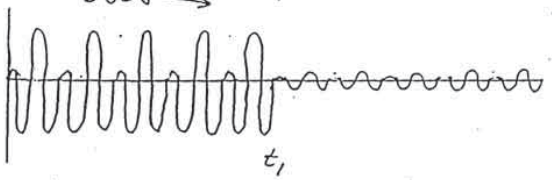


FIG. 58D

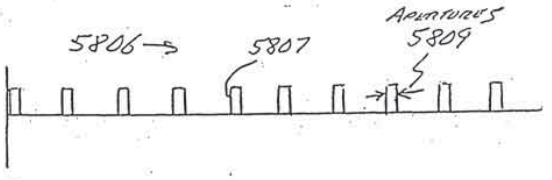


FIG. 58C

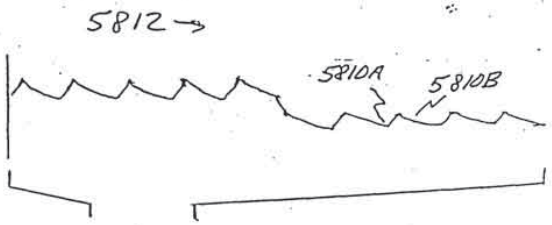


FIG. 58E

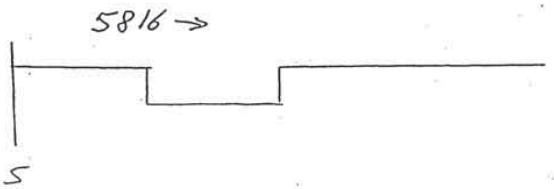


FIG. 58F

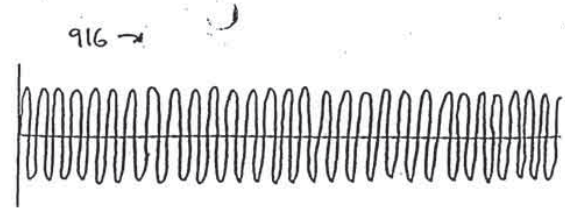


FIG. 59A

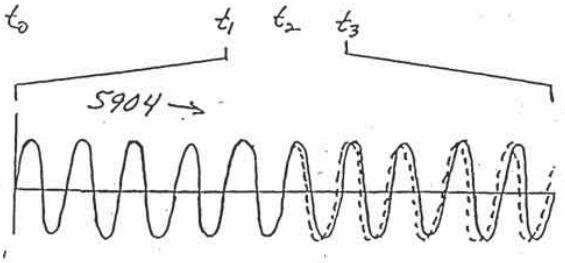


FIG. 59B

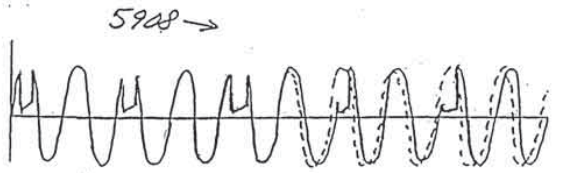


FIG. 59D

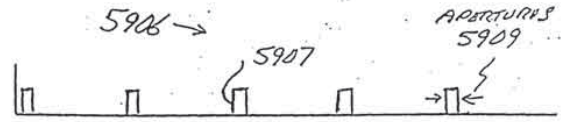


FIG. 59C

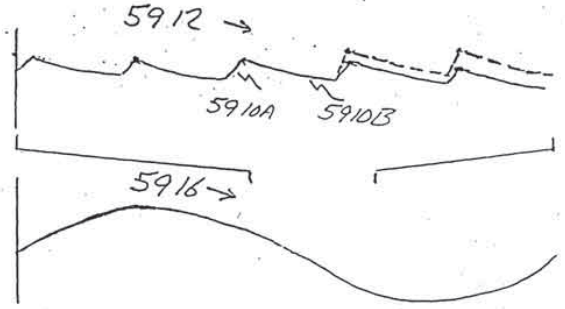


FIG. 59E

FIG. 59F

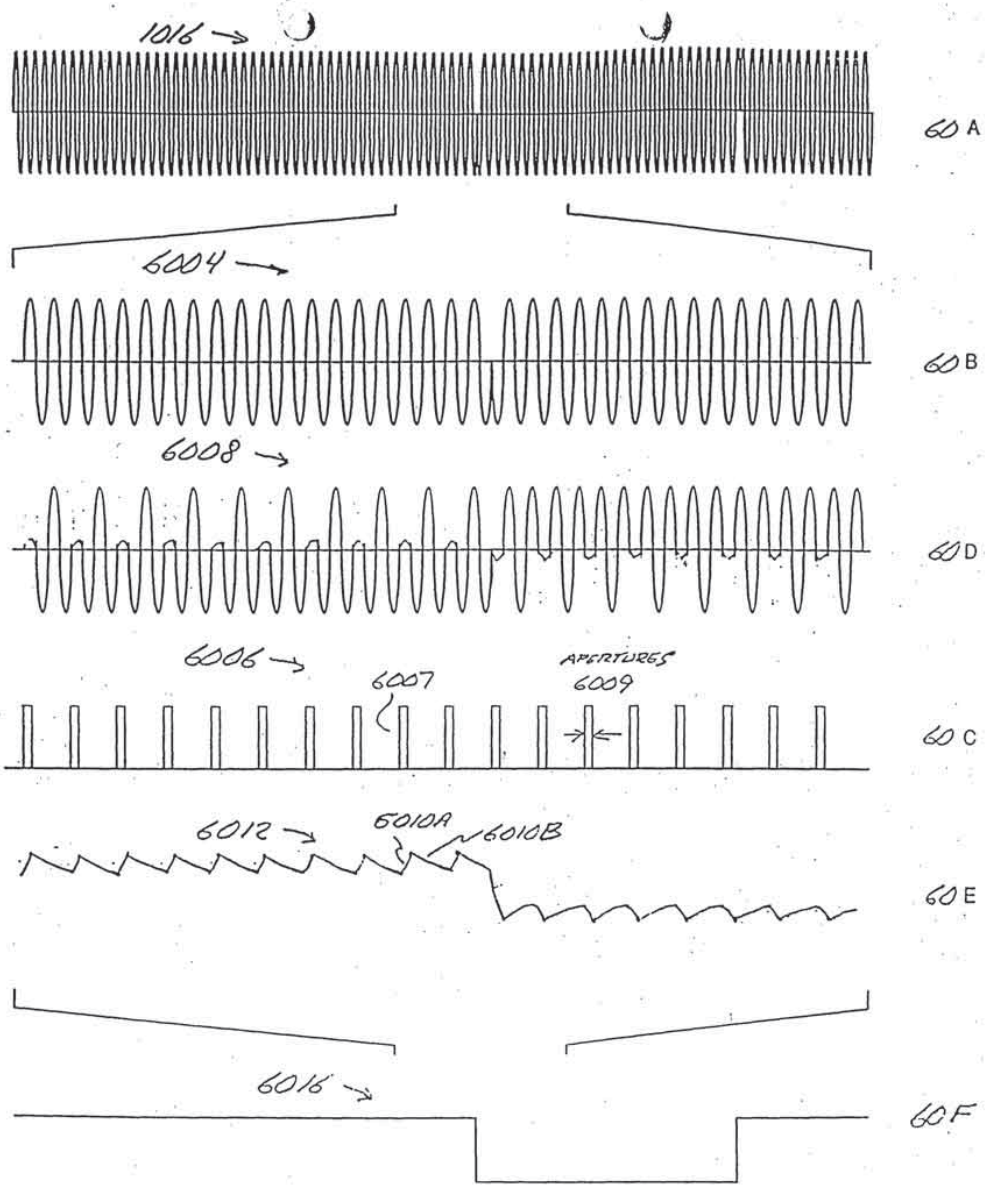

1016
60A
6004
60B
6008
60D
6006
6007
APERTURES
6009
60C
6012
6010A
6010B
60E
6016
60F

FIG 60A-F

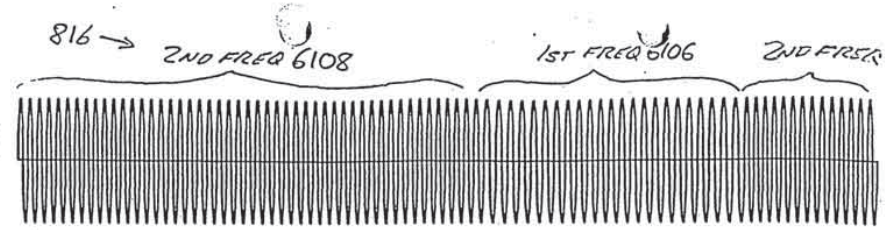


FIG. 61A

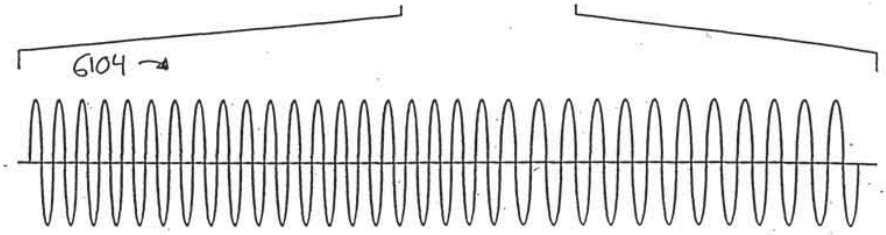


FIG. 61B

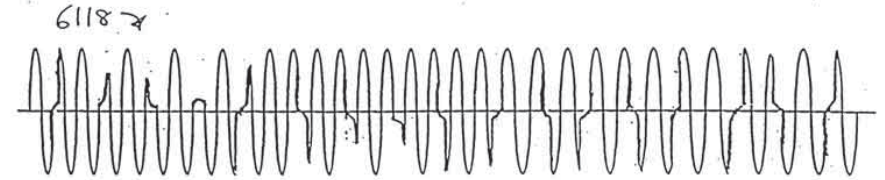


FIG. 61D

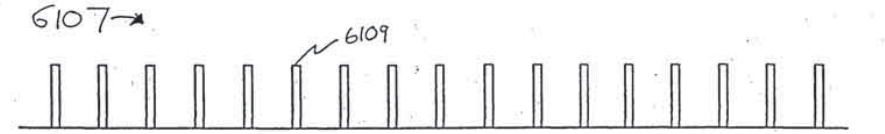


FIG. 61C



FIG. 61E

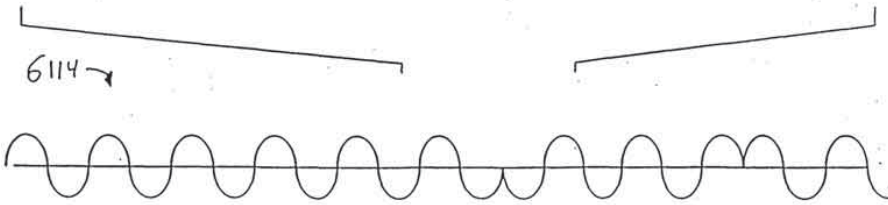


FIG. 61F

S

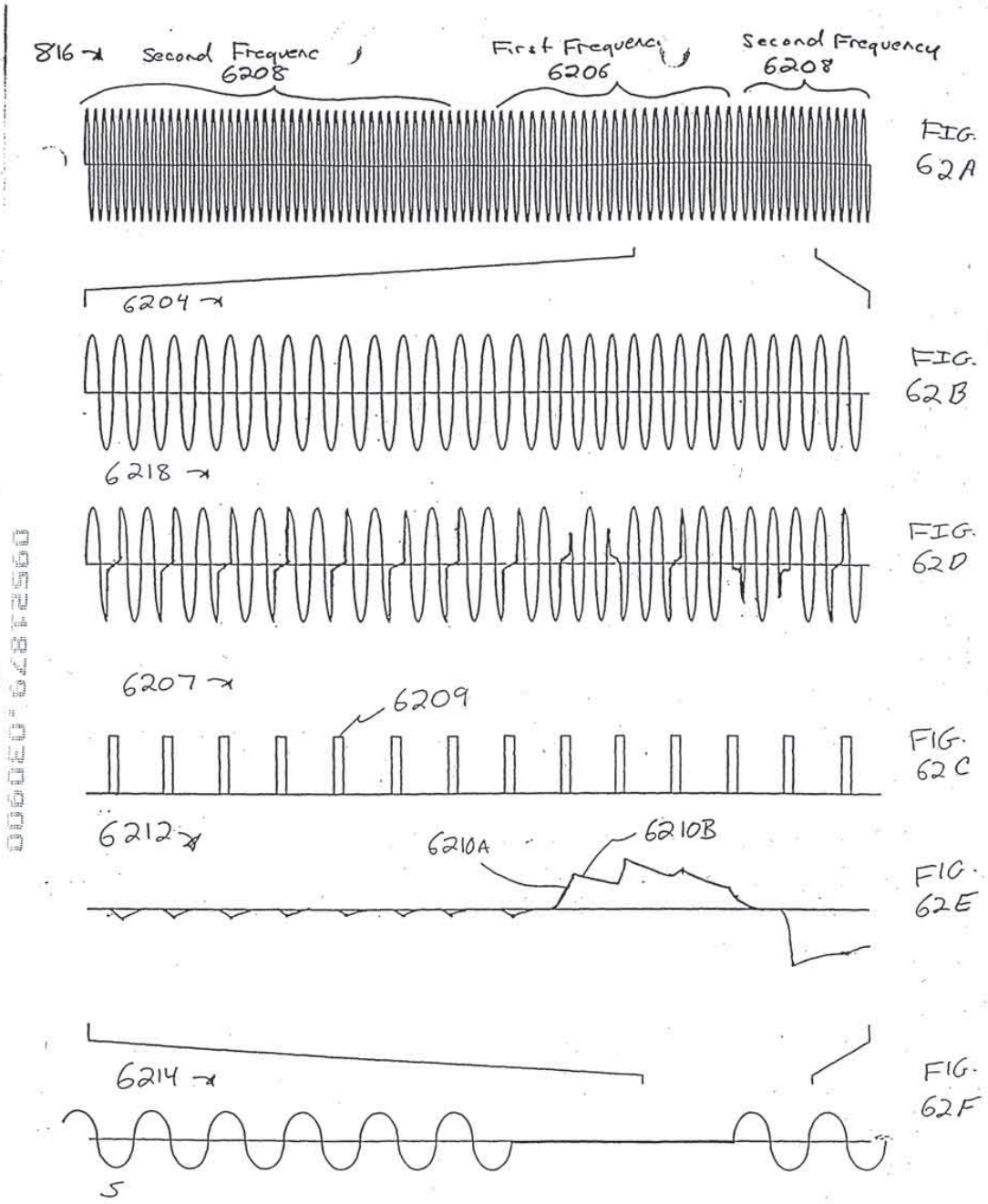


FIG. 62A

FIG. 62B

FIG. 62D

FIG. 62C

FIG. 62E

FIG. 62F

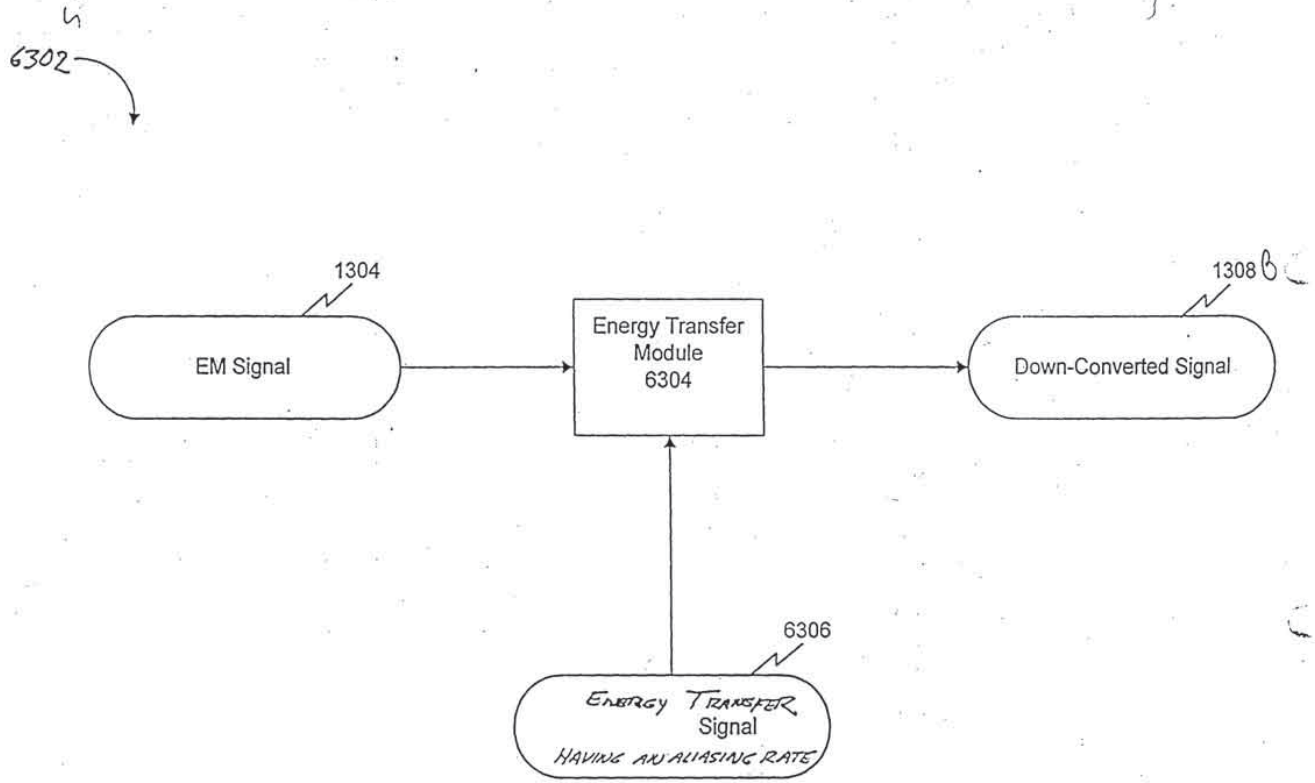


FIG. 63

09521879.030900

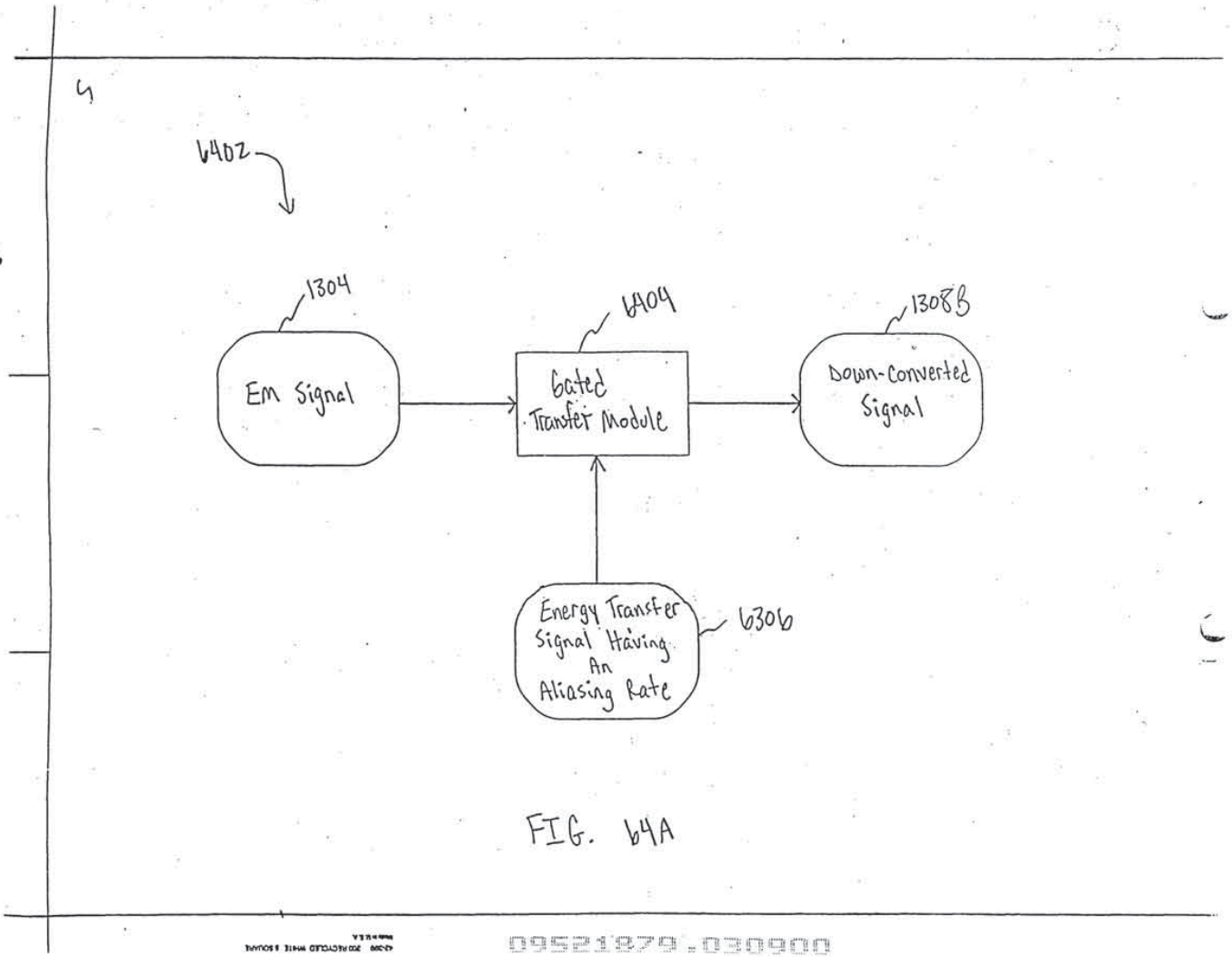


FIG. 64A

09521879.030900

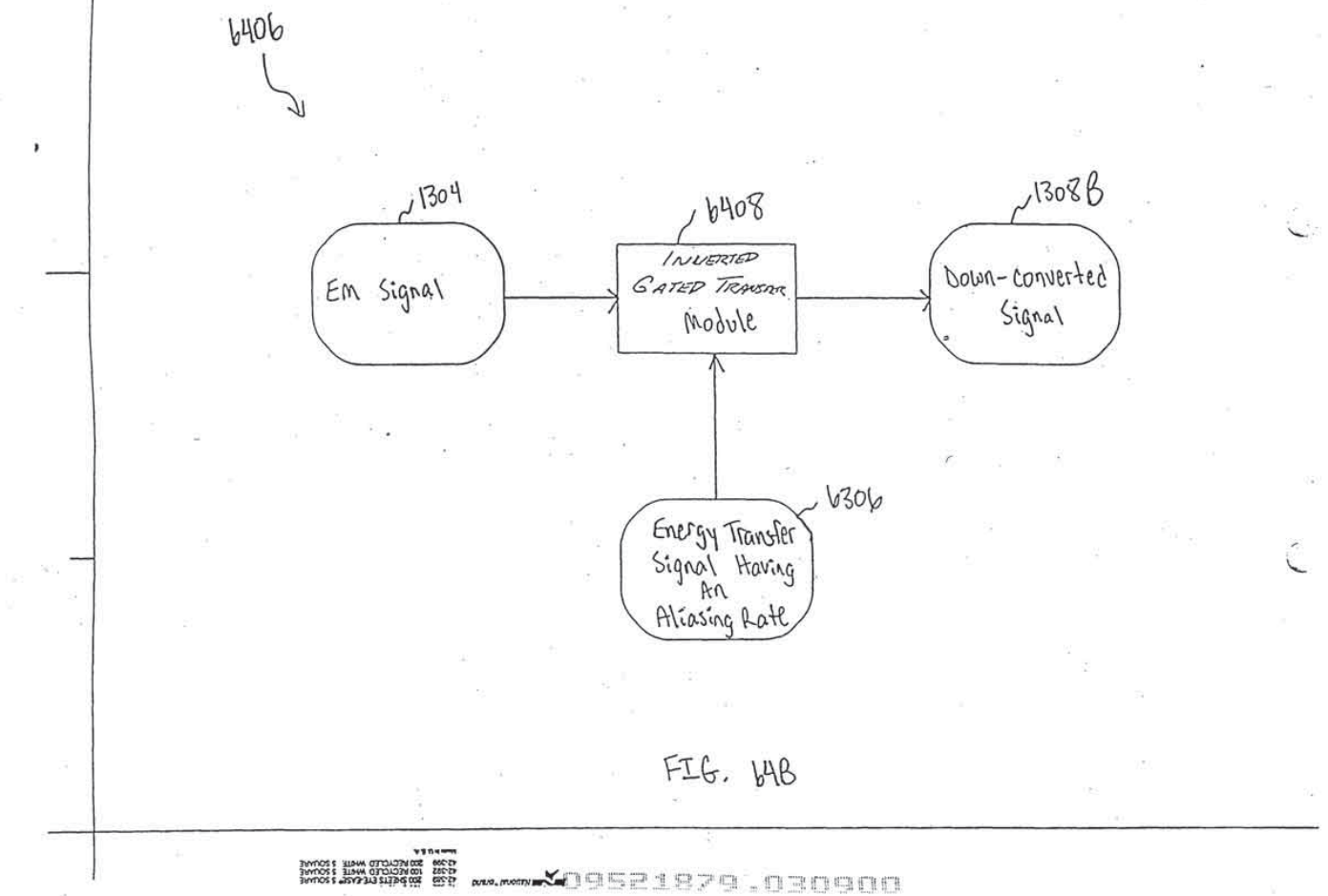


FIG. 64B

09521879.030900

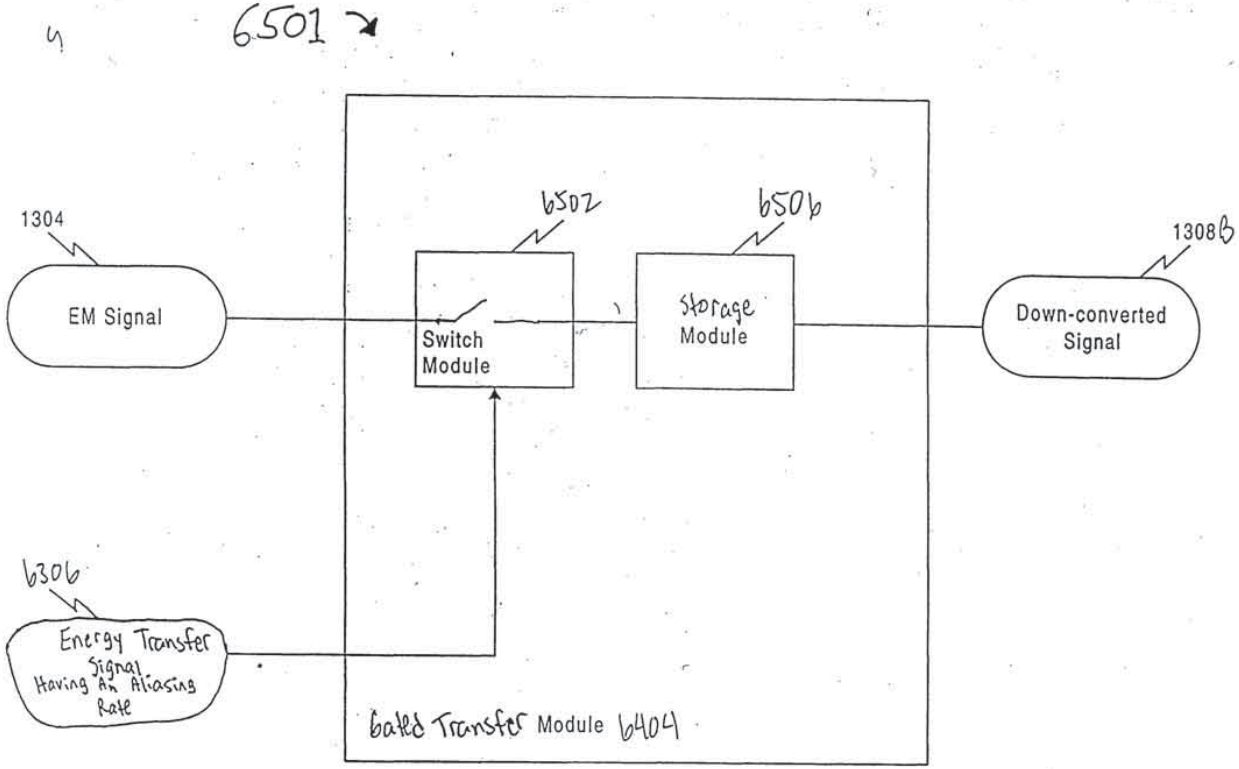

6501
1304
EM Signal
6502
Switch Module
6504
Storage Module
1308B
Down-converted Signal
6306
Energy Transfer Signal Having An Aliasing Rate
Gated Transfer Module 6404

FIG. 65

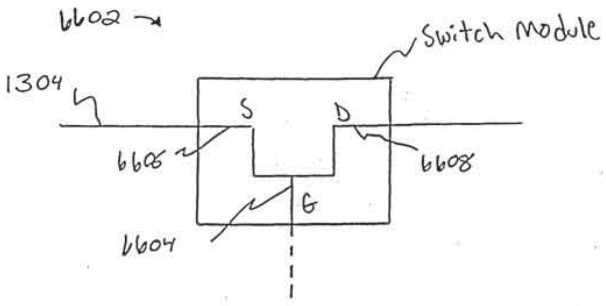


FIG. 66A

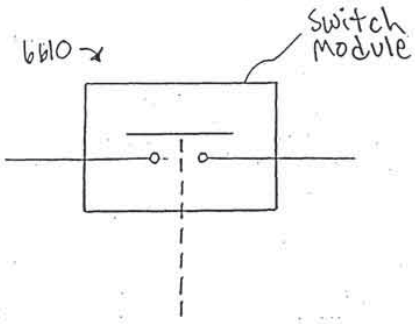


FIG. 66B

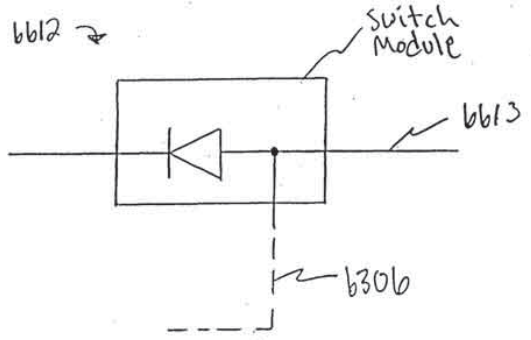


FIG. 66C

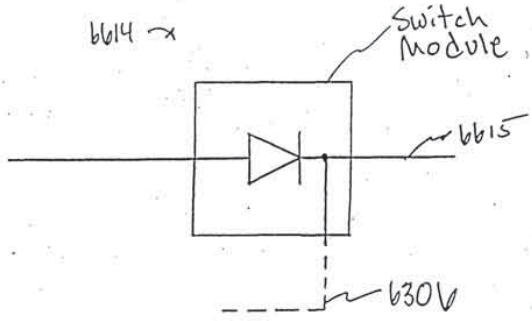


FIG. 66D

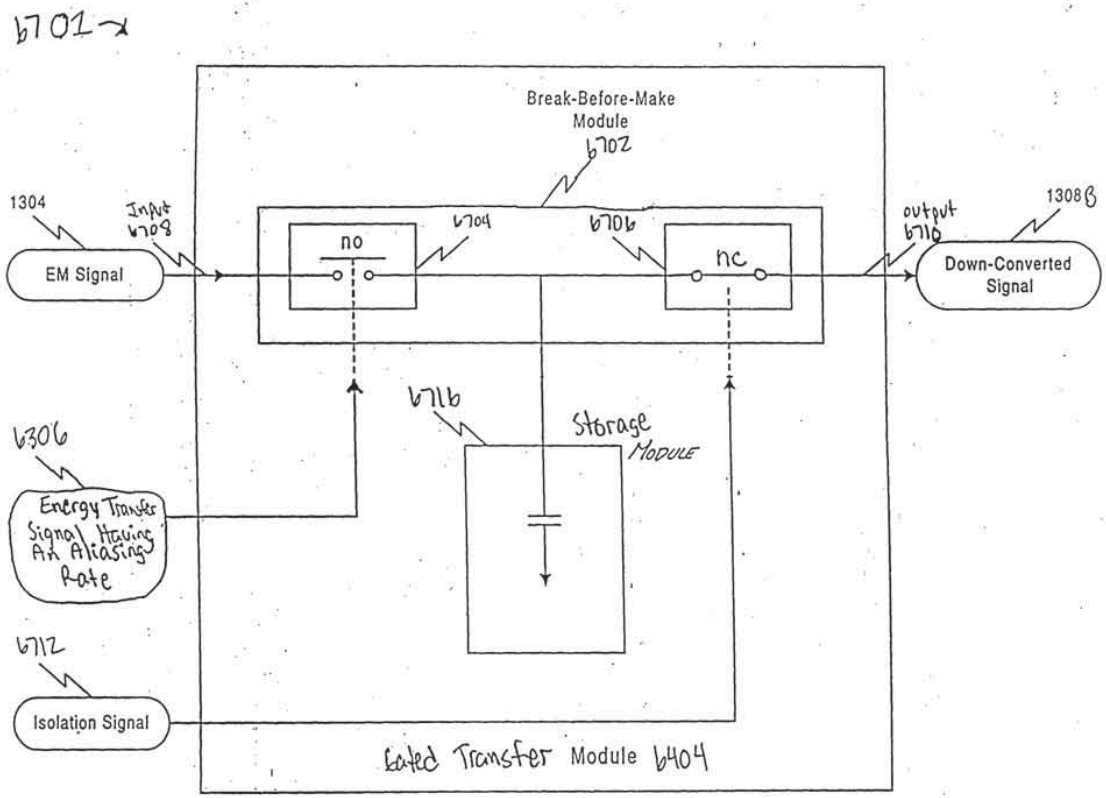


FIG. 67A

09521879.030900

National Brand

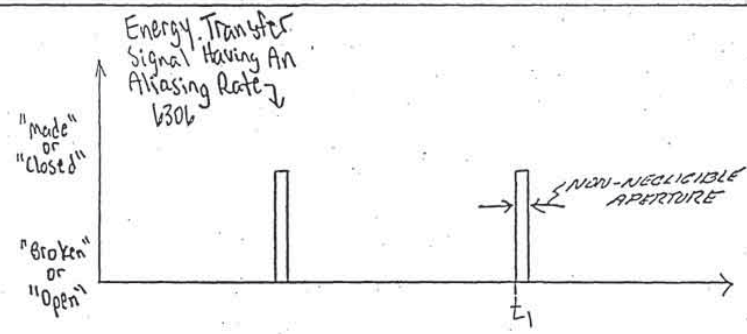


FIG. 67B

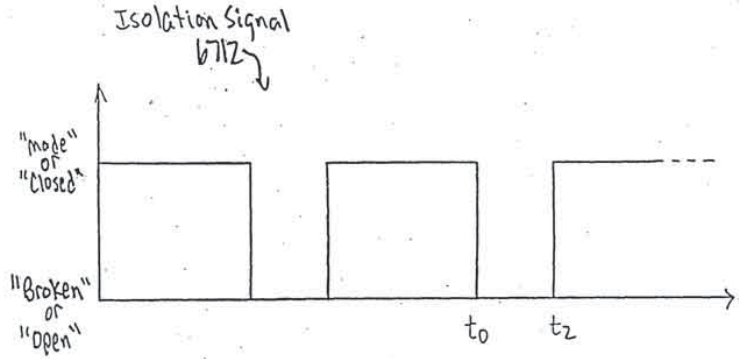


FIG. 67C

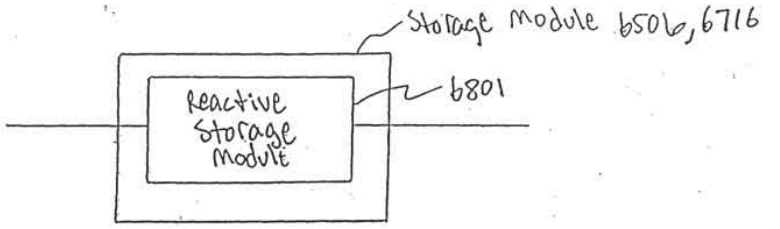


FIG. 68A

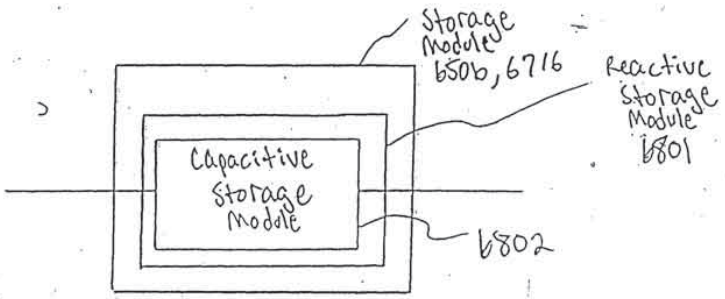


FIG. 68B

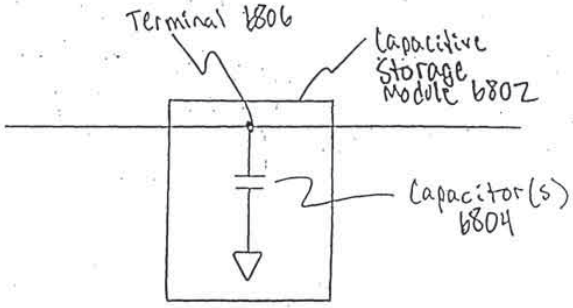


FIG. 68C

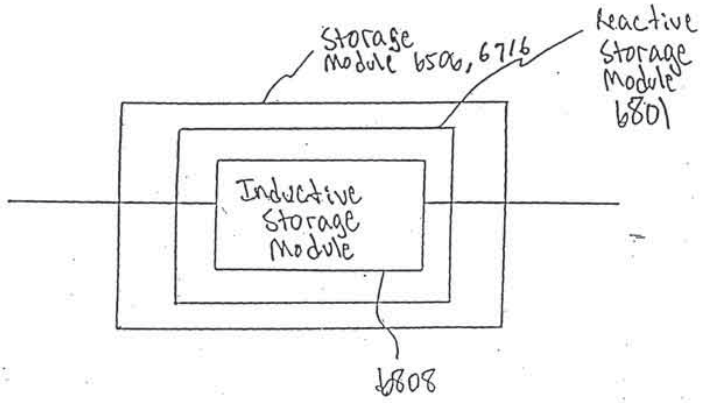


FIG. 68D

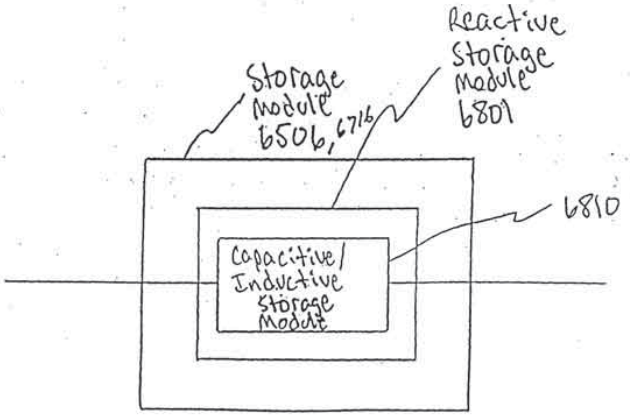


FIG. 68E

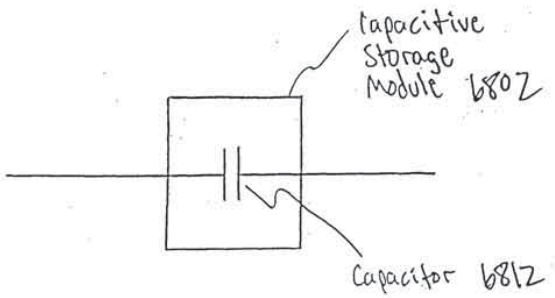


FIG. 68F

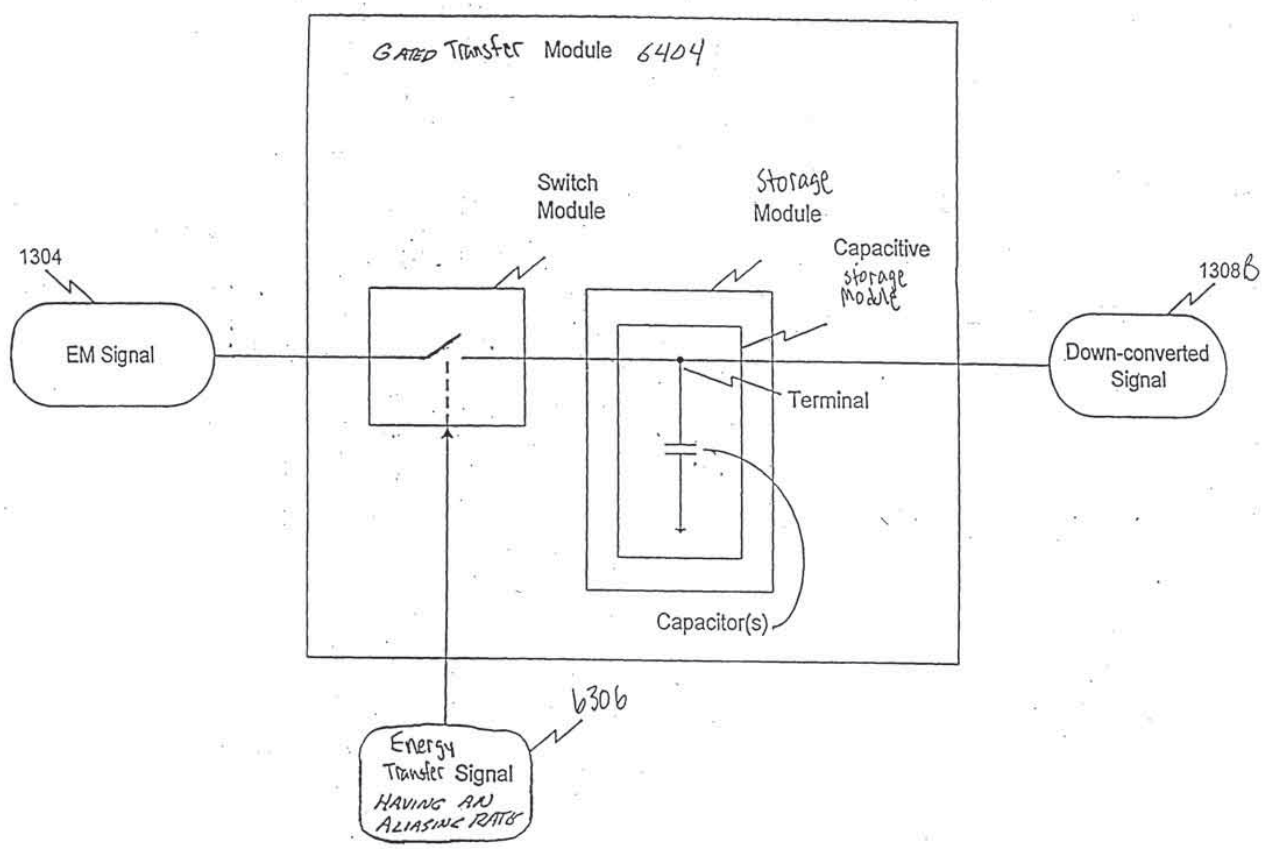
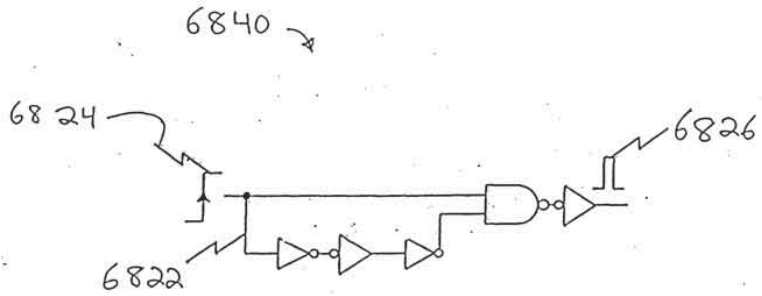


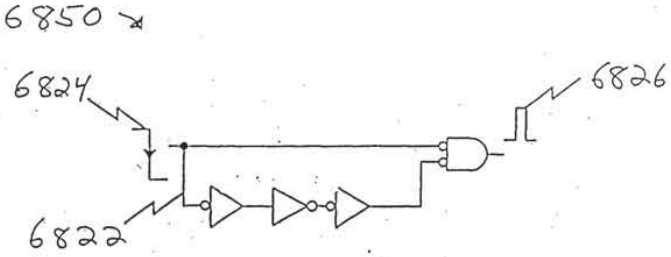
FIG. 68G

09521879.030900



A. rising edge pulse generator

FIG. 68H



B. falling-edge pulse generator

FIG. 68I

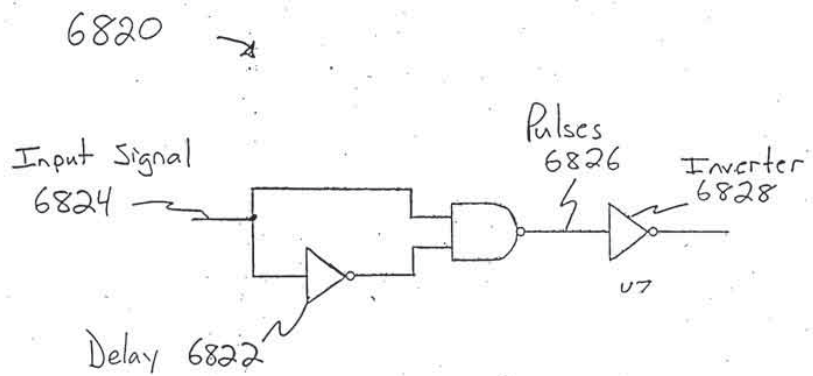


FIG 68J

09521879.030900

1004

Input signal
6824
inverter
M168
M169
vdd
vnbo
vss
M172
M170
M171
nand
Pass
6826

FIG 68K

Oscillator
6830
Input signal
6824

687

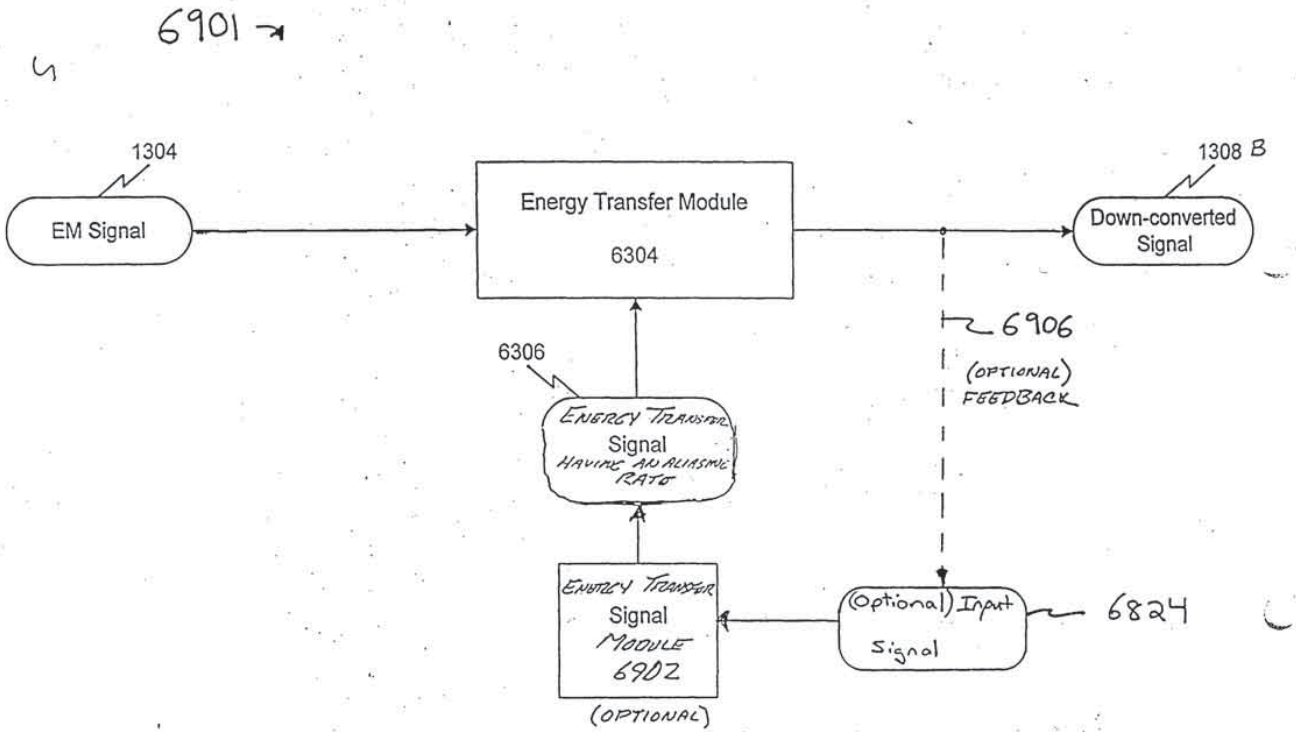


FIG. 69

09521879.030900

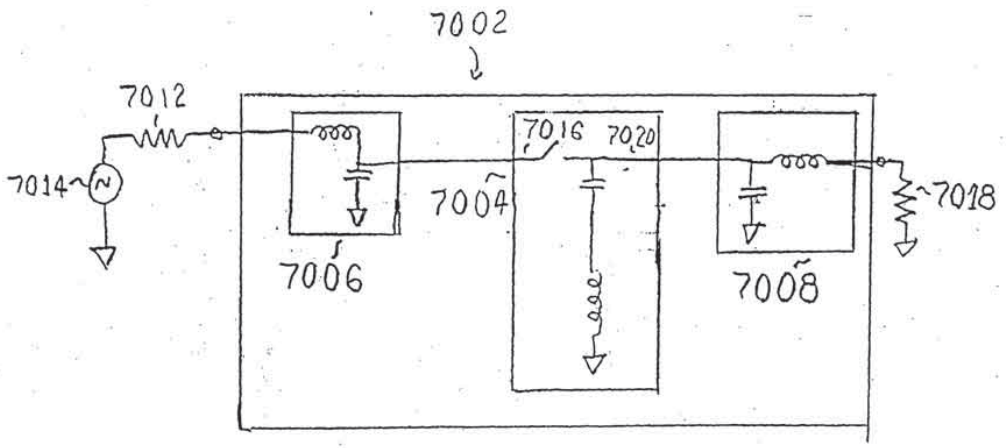


Fig 70 - Impedance Matched Aliasing Module

09521879.030900

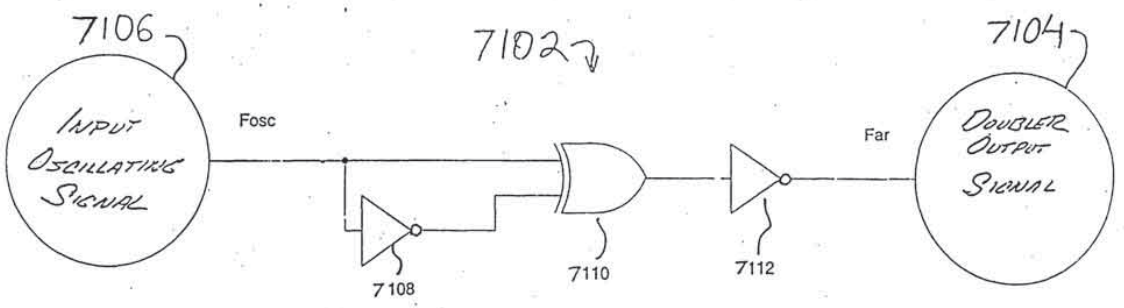

7106
INPUT OSCILLATING SIGNAL
Fosc
7102
7108
7110
7112
Far
7104
DOUBLER OUTPUT SIGNAL

FIG 7A

1008

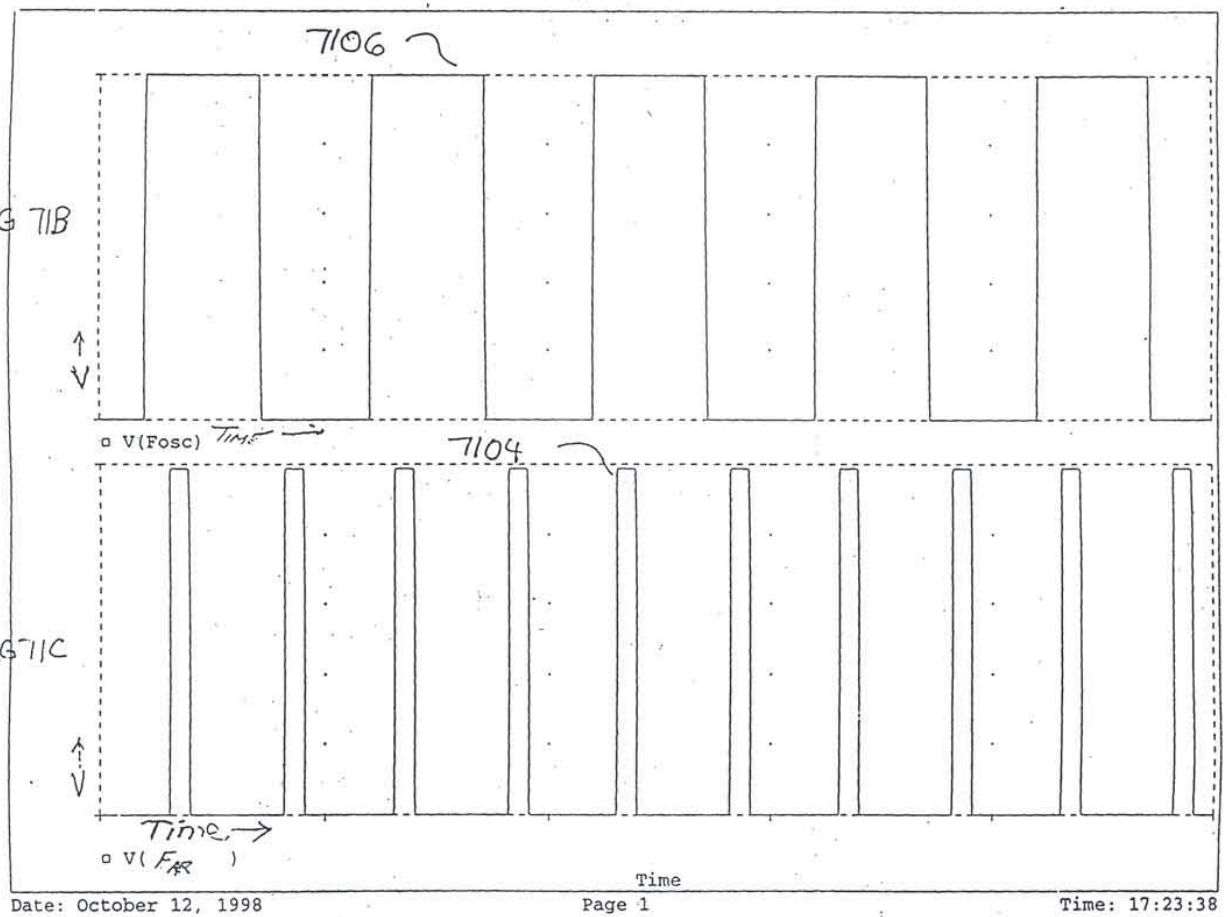


FIG 7B

FIG 7C

1009

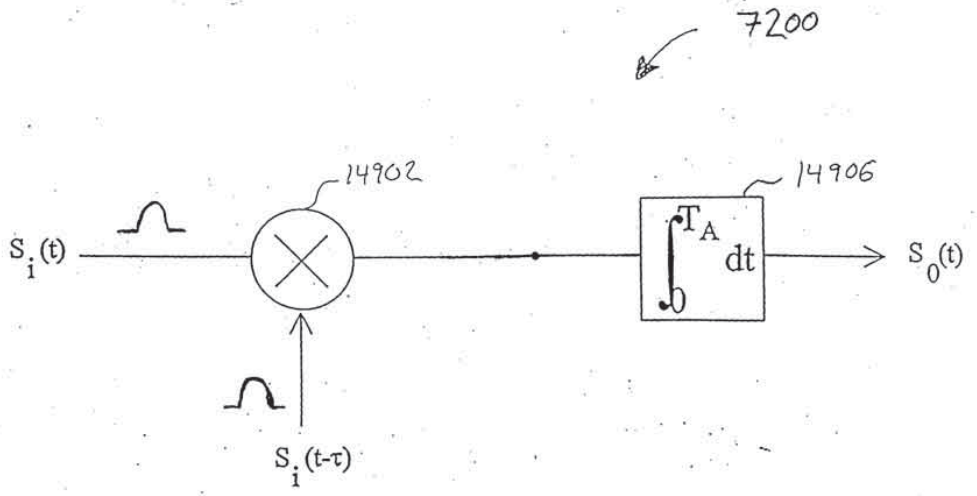


FIG. 72

09521879.030900

1010

Fig 73 - Aliasing Module

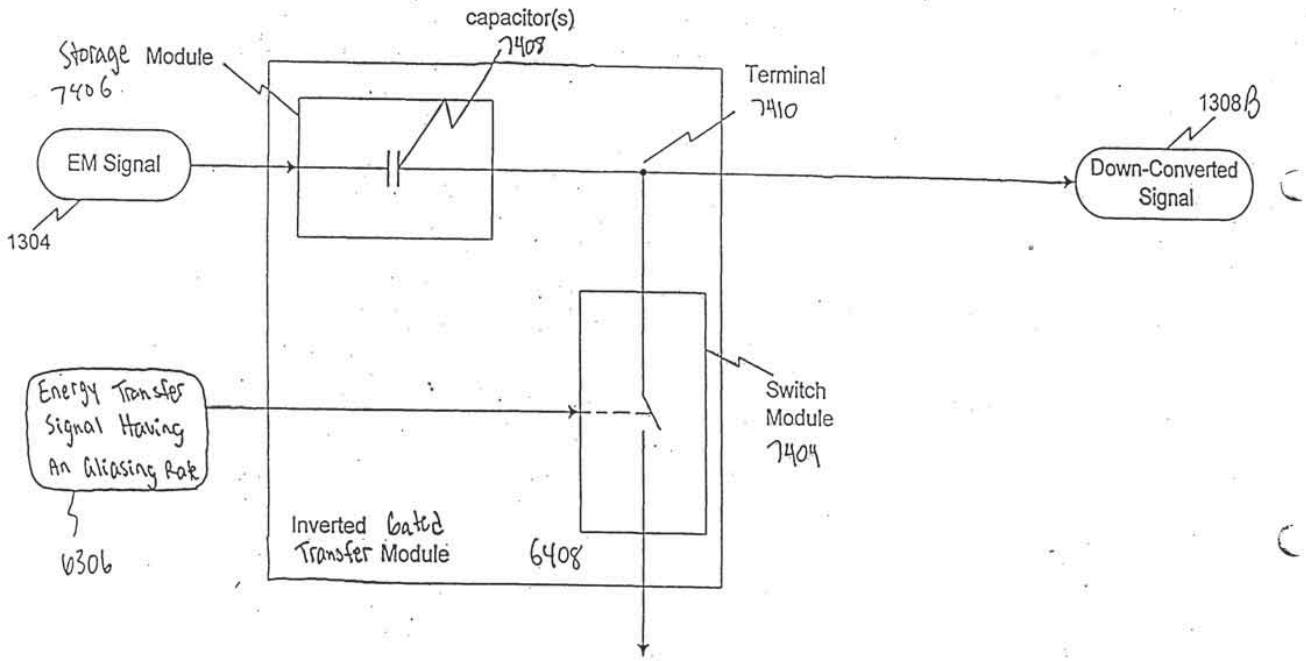


FIG. 74

09521879.030900

1012

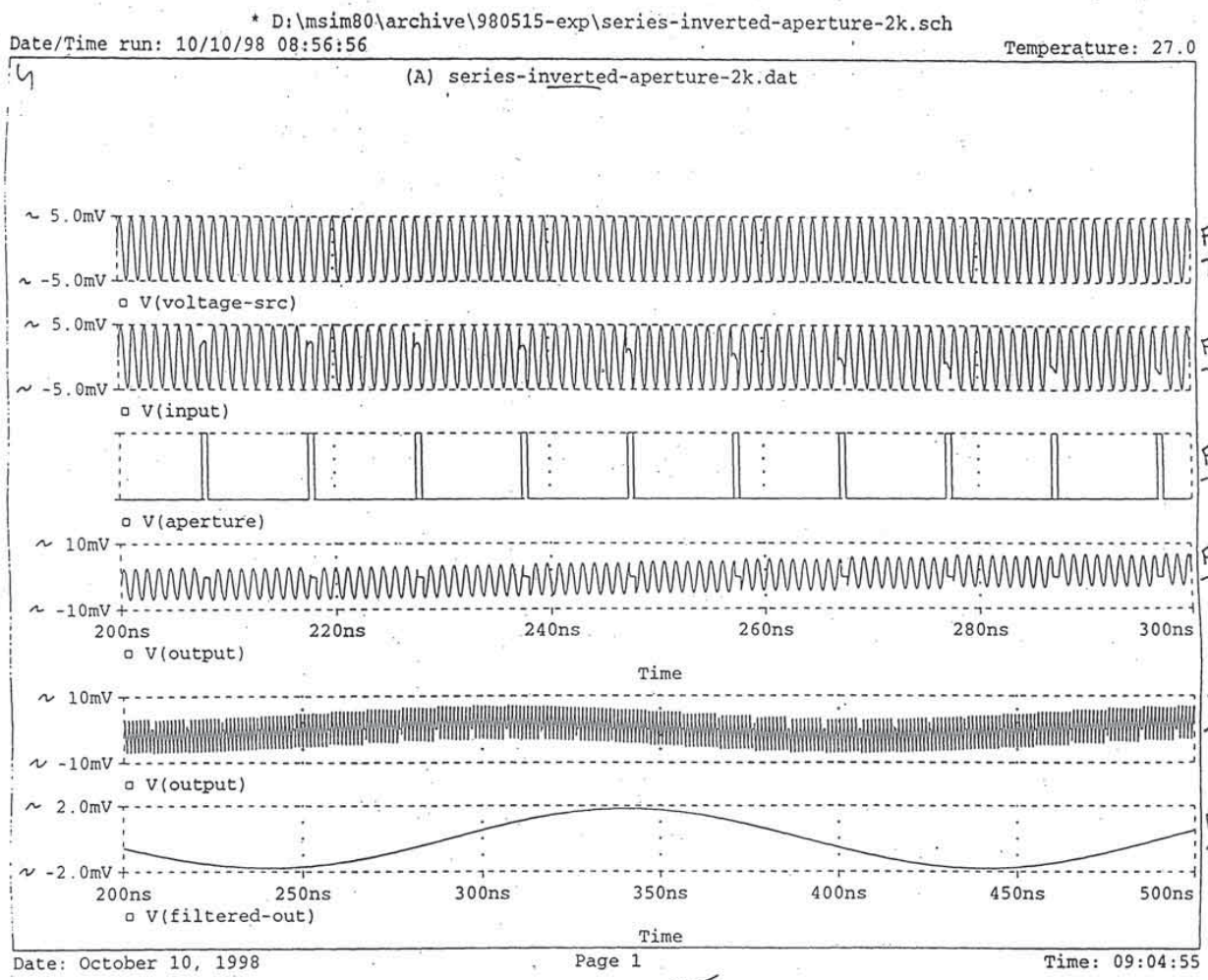
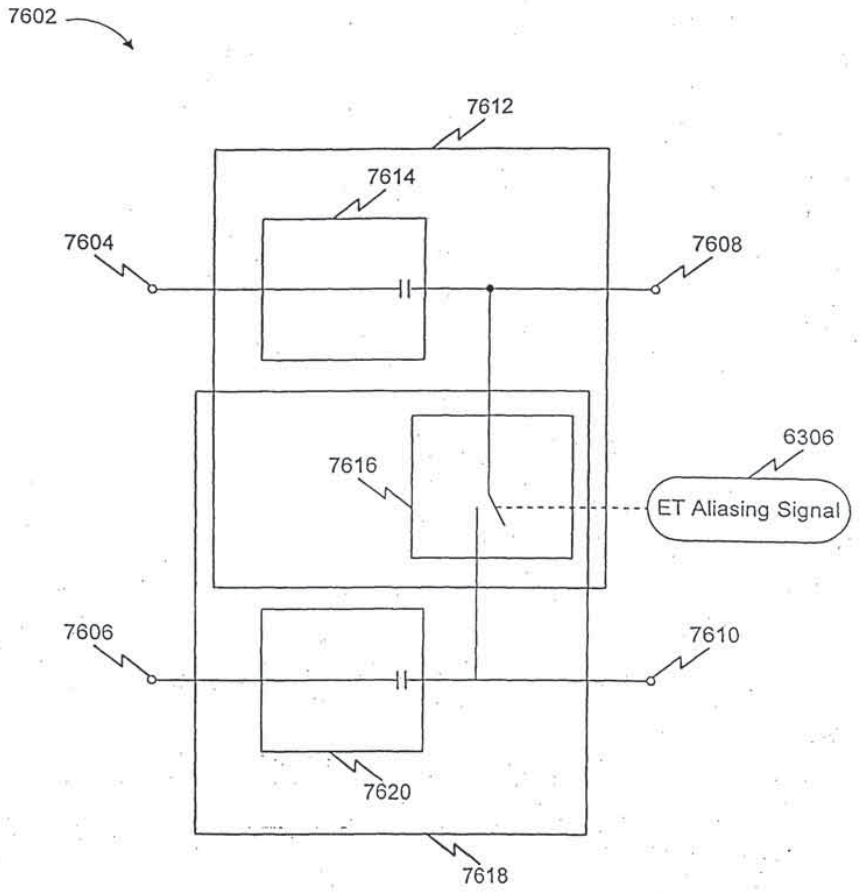


FIG 75

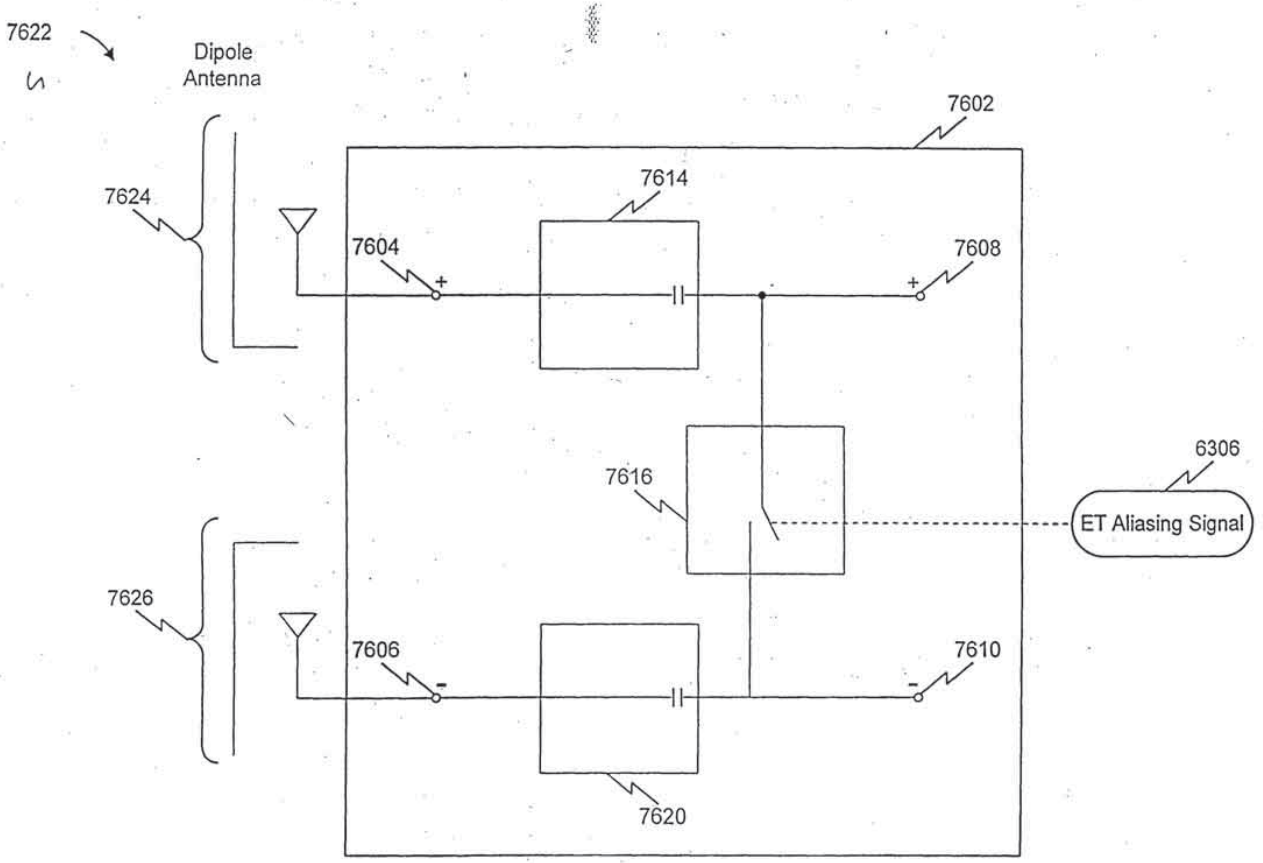
0952879.030900



Differential Energy Transfer Configuration

FIG. 76A

9807-10.vsd/40



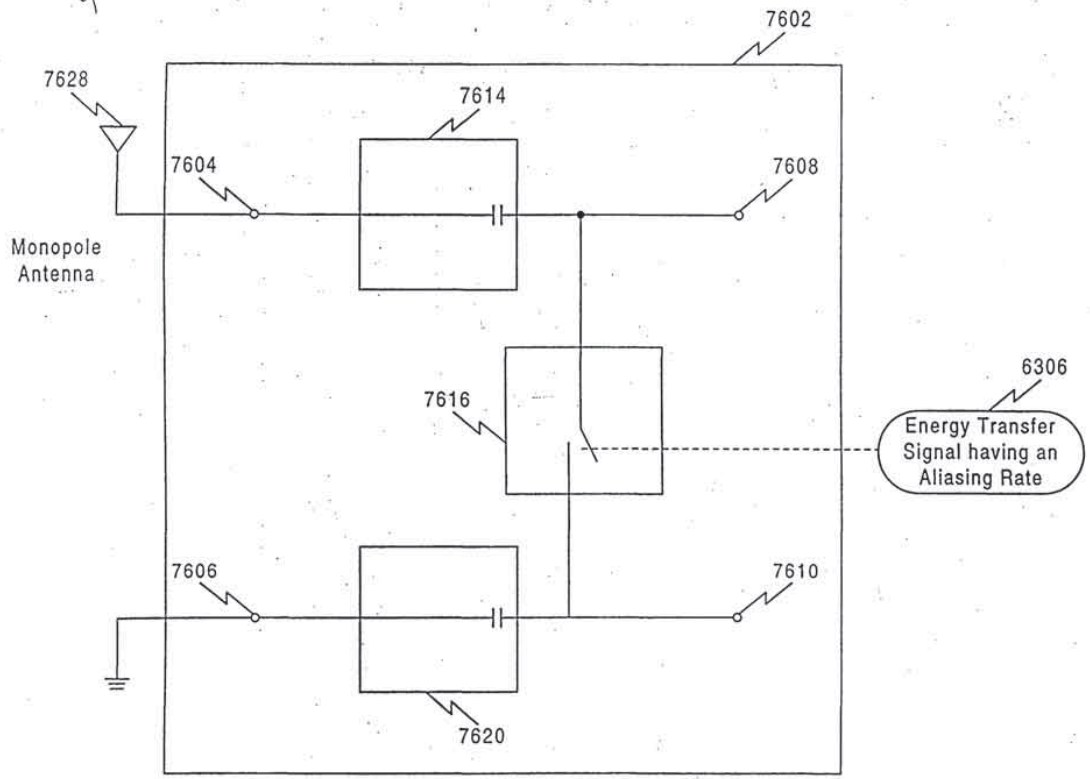
Differential Input to Differential Output

FIG. 76B

9807-10.vsd/41

09521879.030900

1015

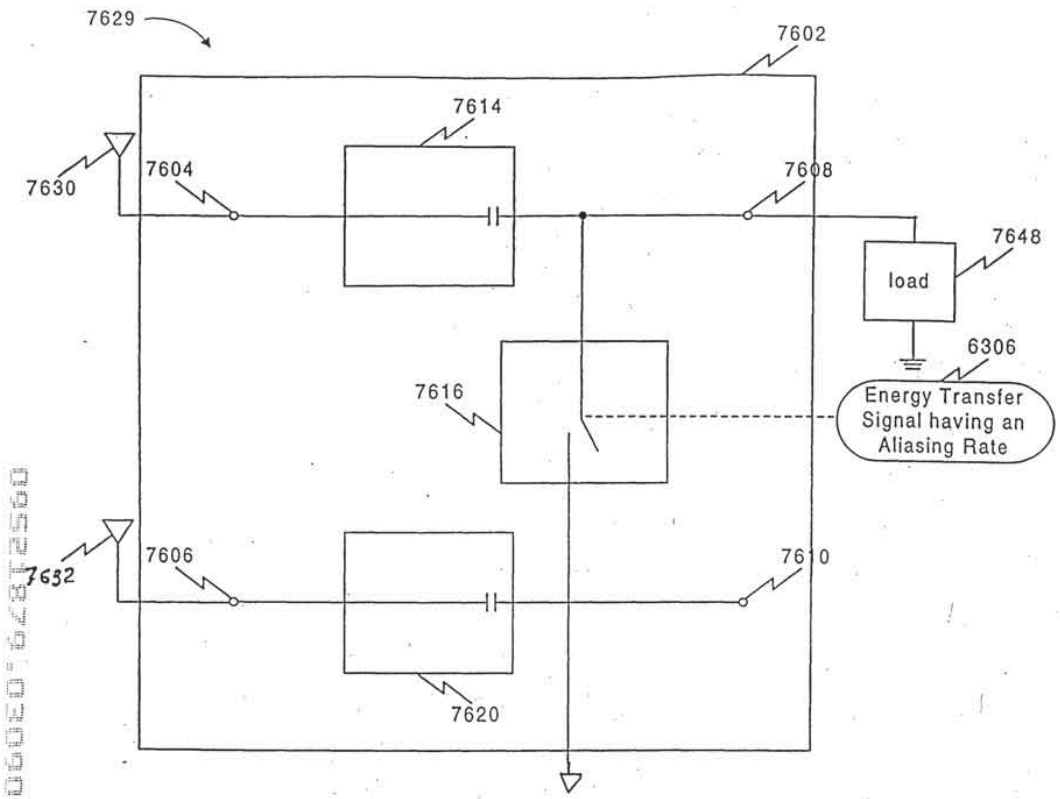


Single Input to Differential Output

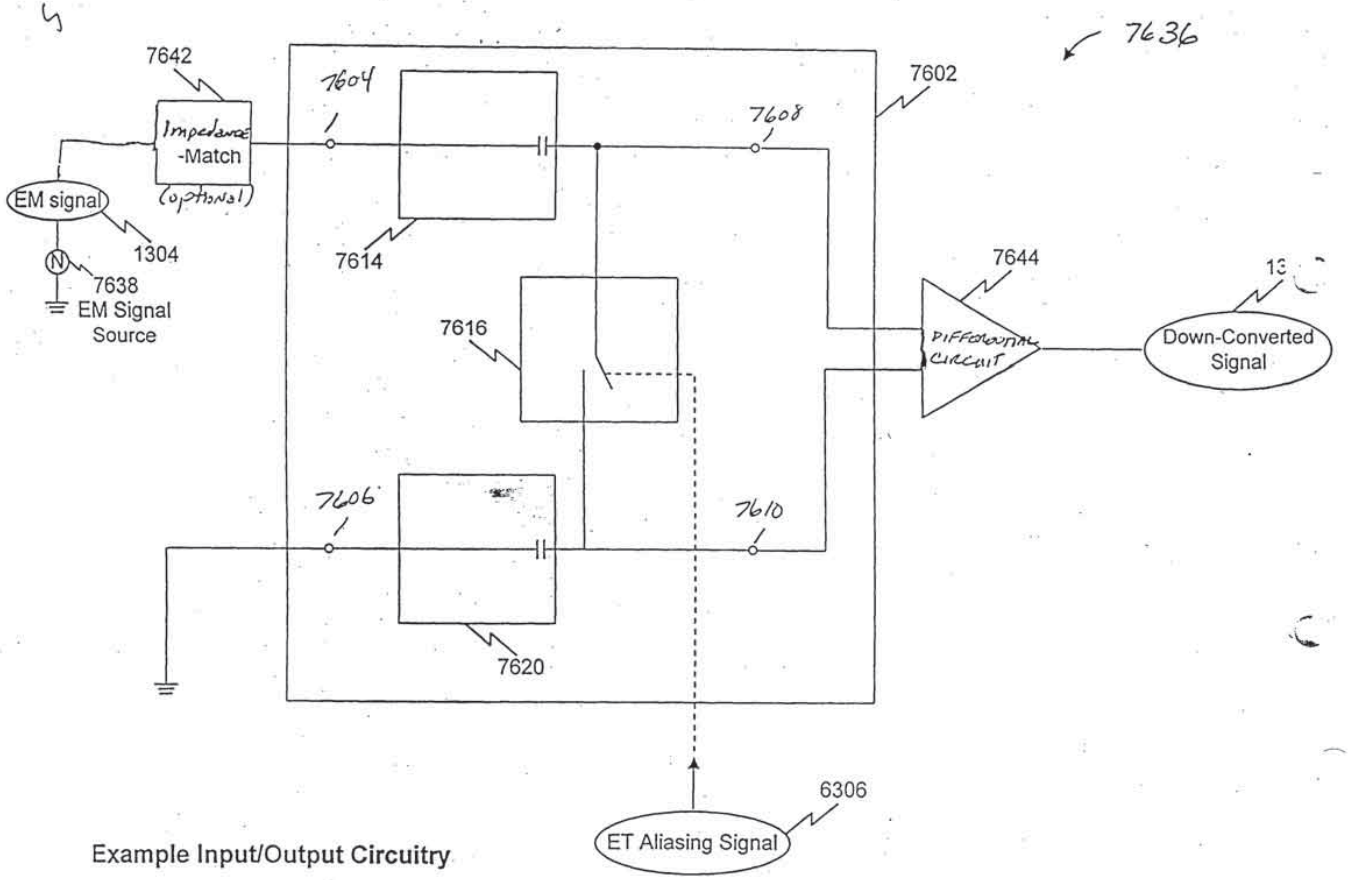
FIG. 76C

09521879.030900

1016



Differential Input to Single Output
FIG. 76D



Example Input/Output Circuitry

FIG. 76E

9807-10.vsd/44

09521879.030900

1018

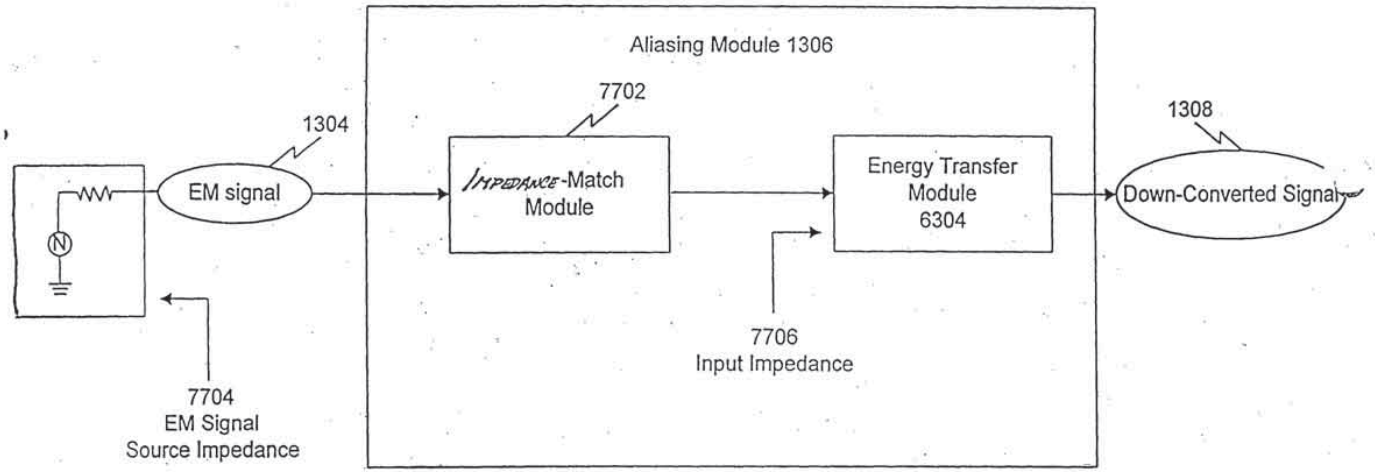


FIG. 77A

9507-10.vsd/45

09521879.030900

1019

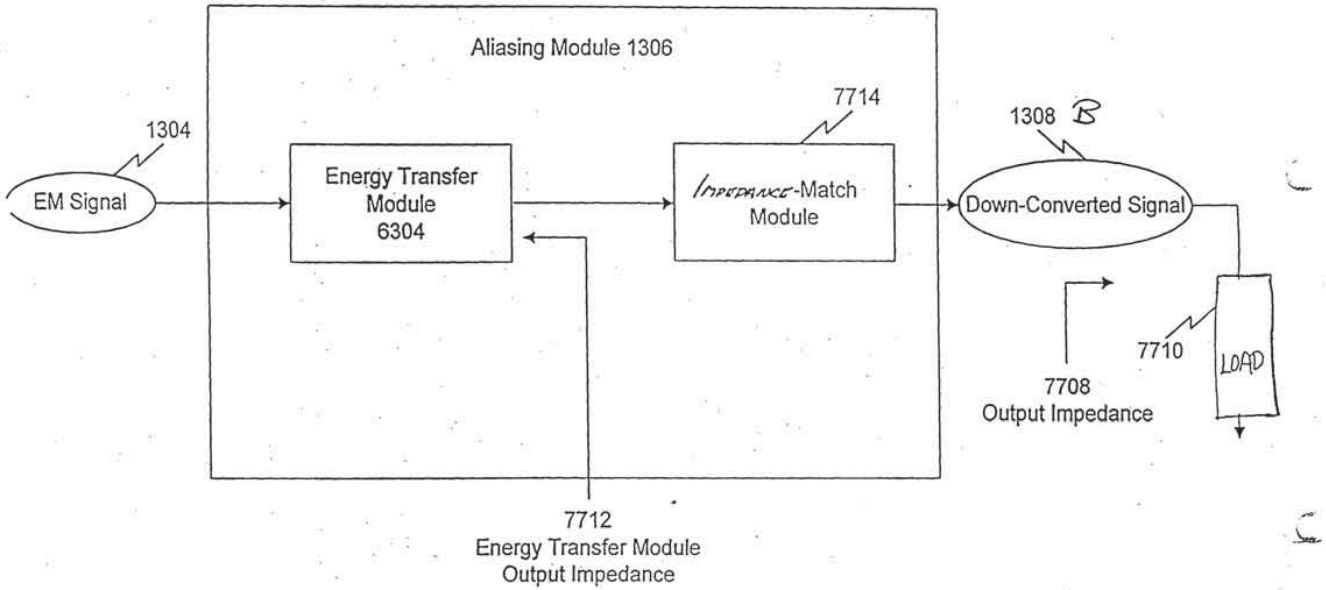


FIG. 77B

09621879.030900

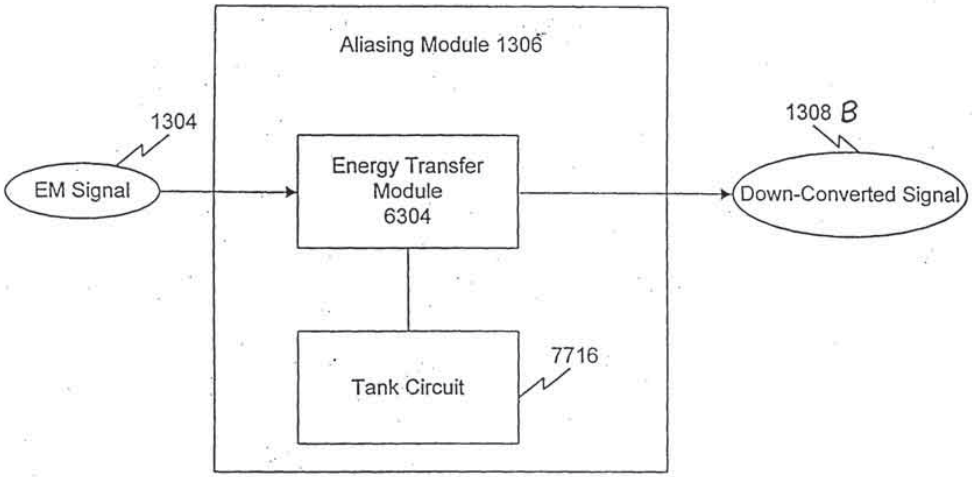
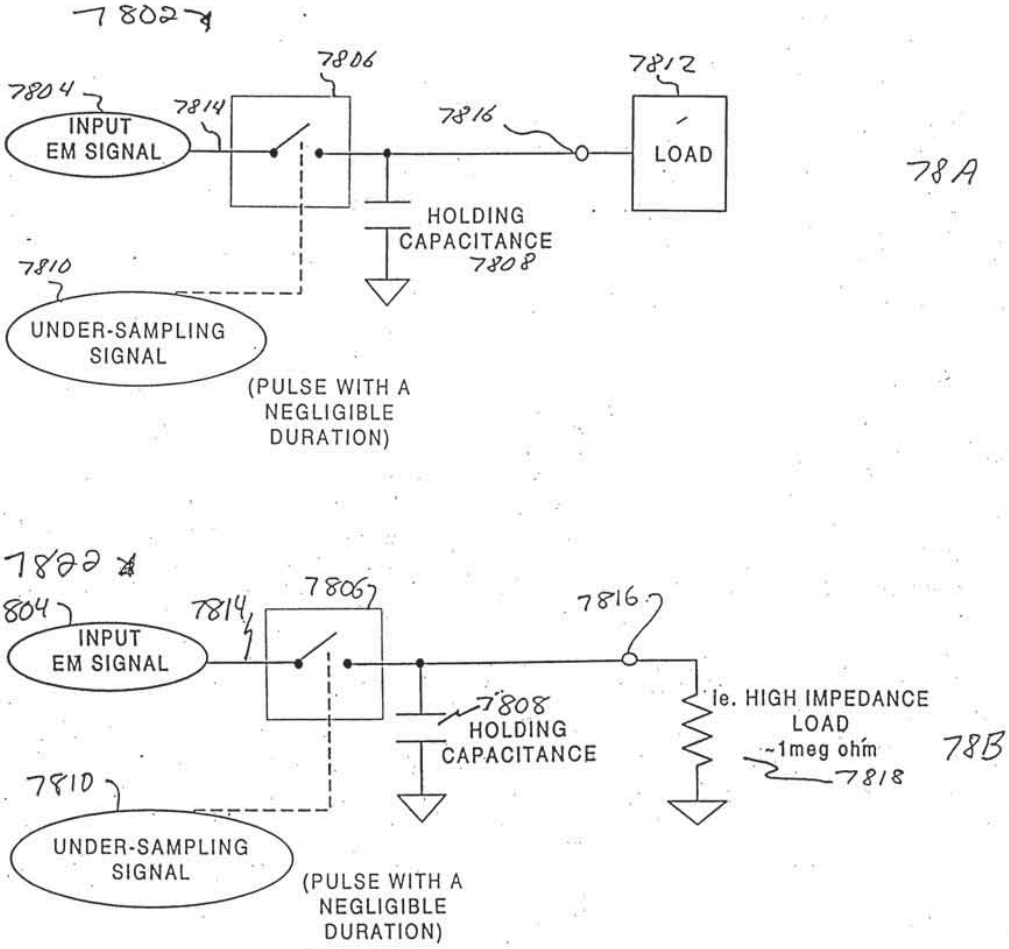


FIG. 77C

09521879.030900


7802
7804
INPUT
EM SIGNAL
7814
7806
7816
7812
LOAD
78A
HOLDING
CAPACITANCE
7808
7810
UNDER-SAMPLING
SIGNAL
(PULSE WITH A
NEGLIGIBLE
DURATION)
7802
7804
INPUT
EM SIGNAL
7814
7806
7816
7808
HOLDING
CAPACITANCE
ie. HIGH IMPEDANCE
LOAD
~1meg ohm
7818
78B
7810
UNDER-SAMPLING
SIGNAL
(PULSE WITH A
NEGLIGIBLE
DURATION)

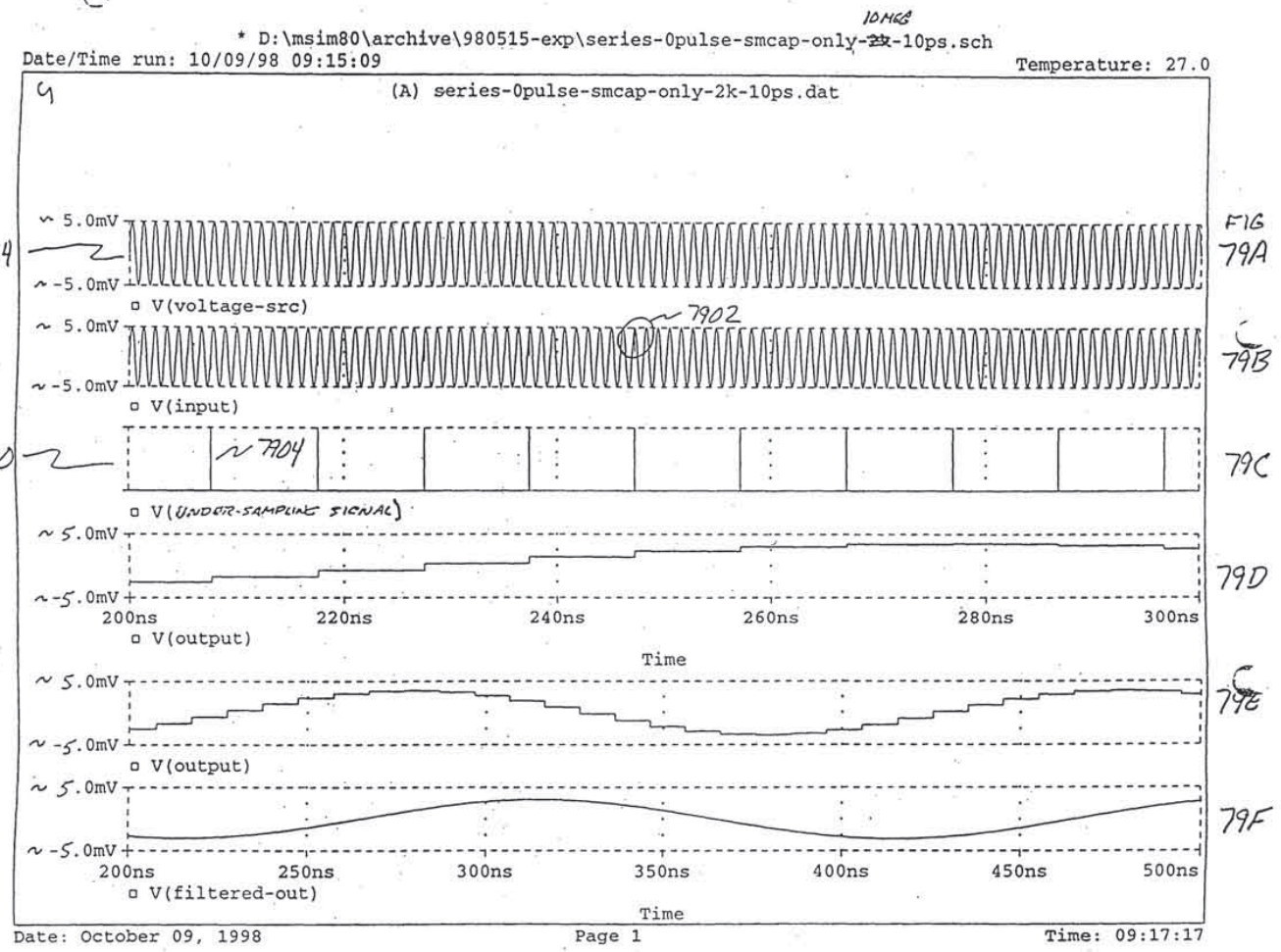


FIG 79

09521879.030900

1023

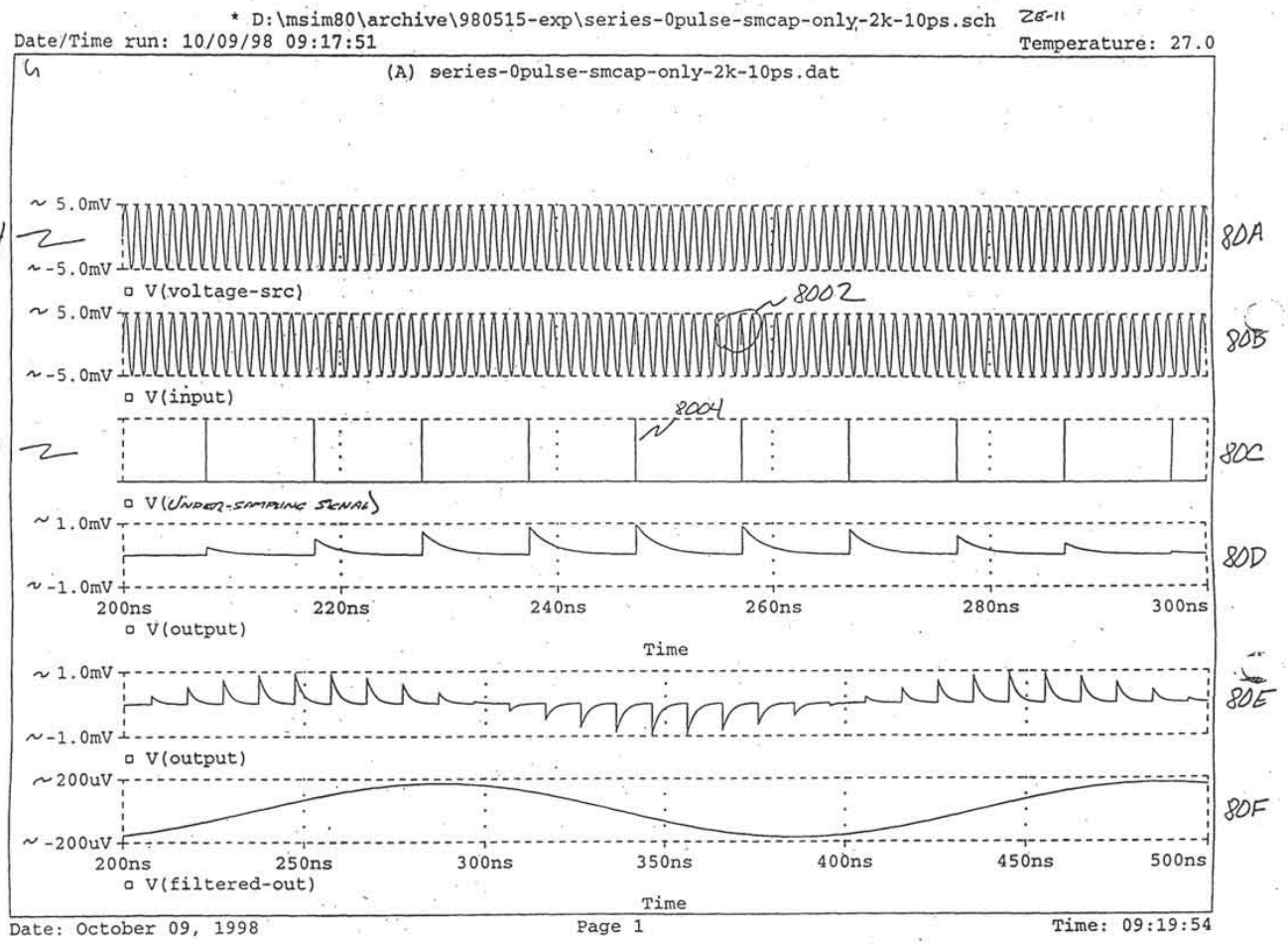


FIG 80

09521879.030900

1024

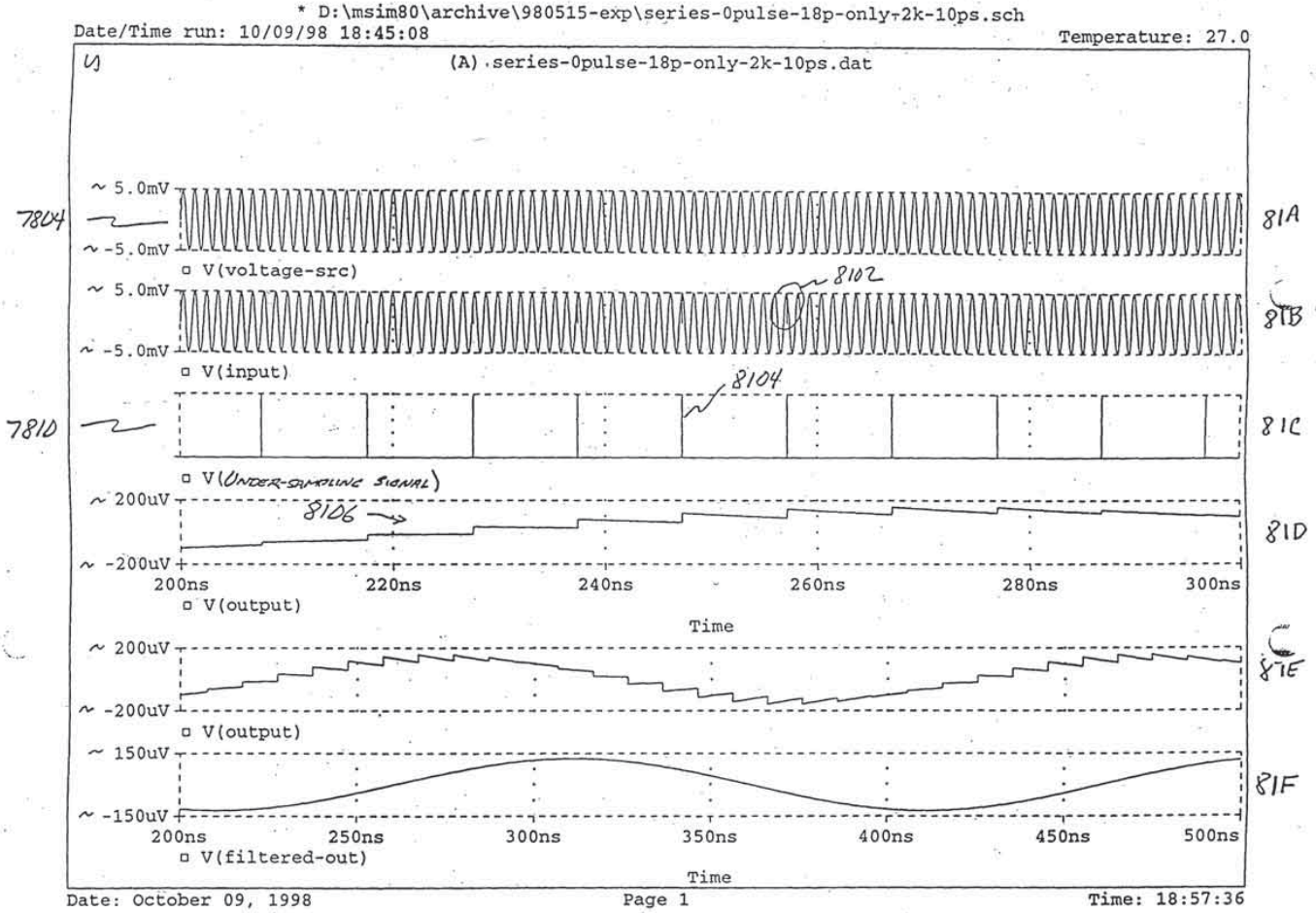


FIG 81

09521879.030900

1025

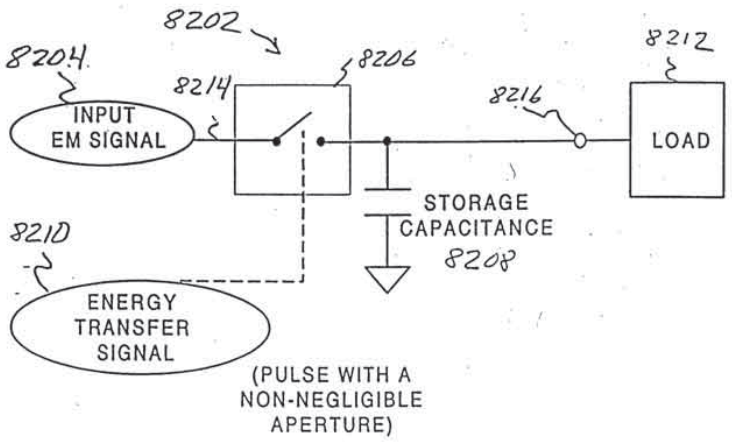


FIG. 82A

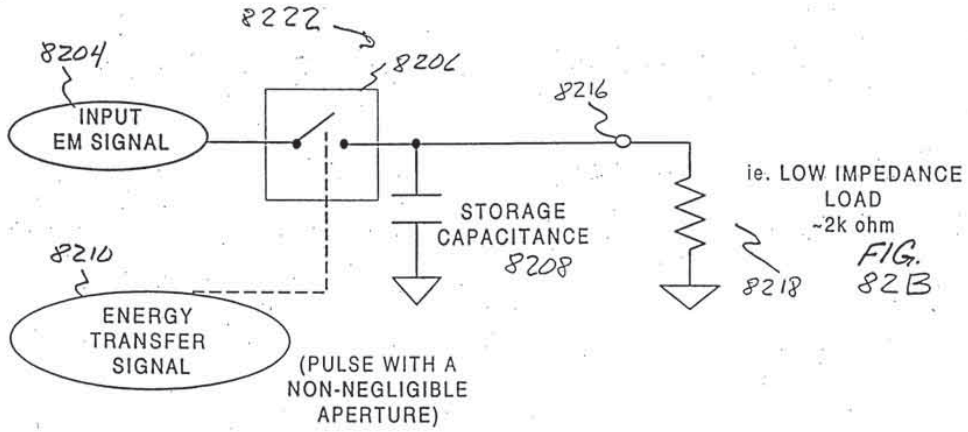


FIG. 82B

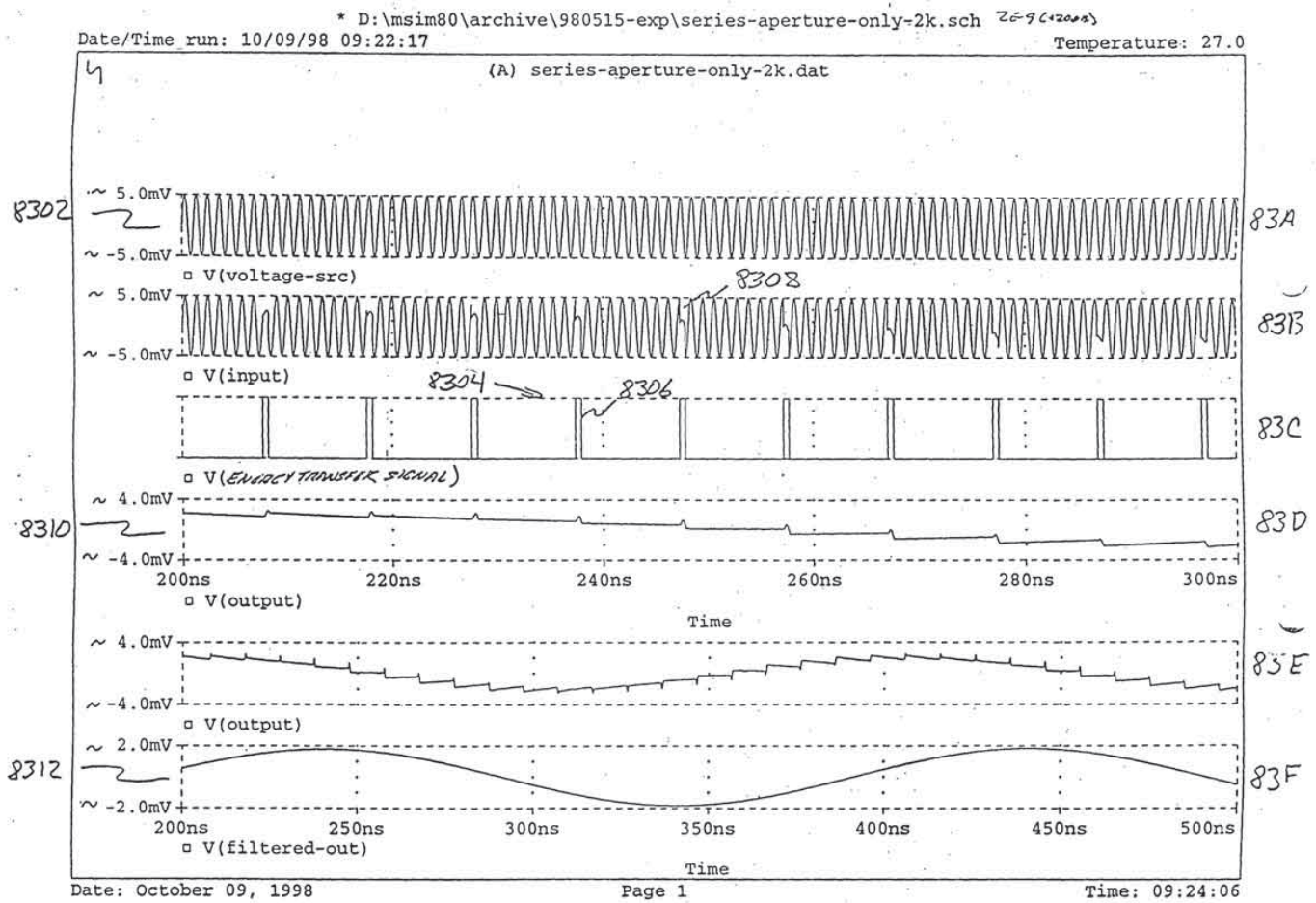


FIG 83A-F

09521879.030900

1027

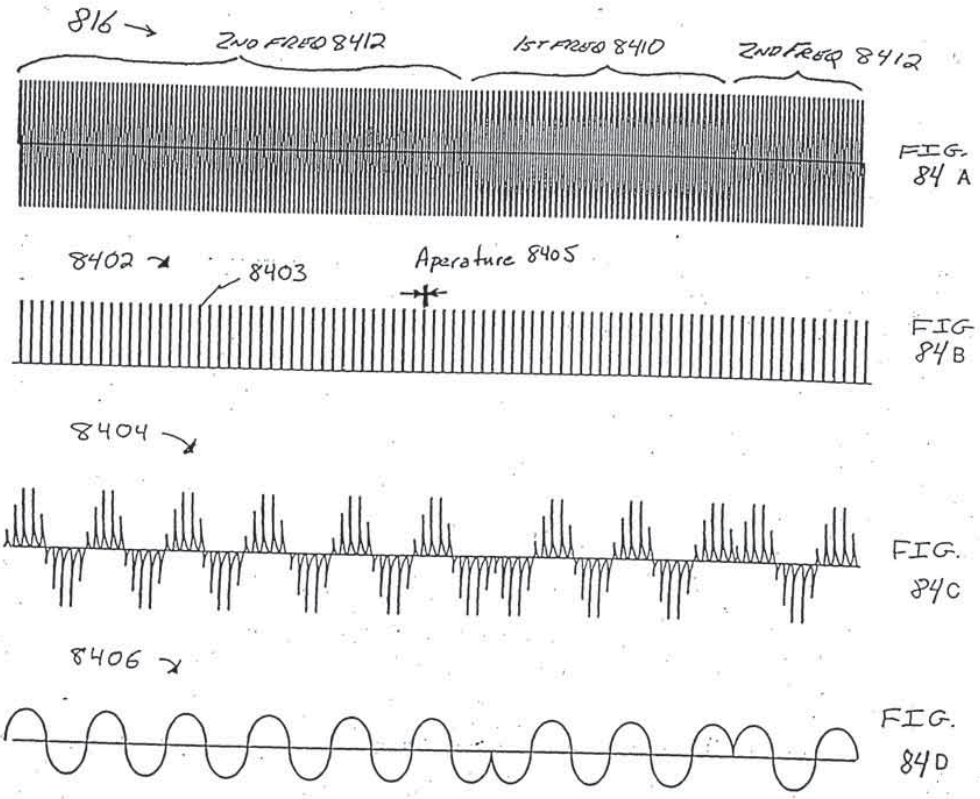


FIG. 84 A

FIG 84 B

FIG. 84 C

FIG. 84 D

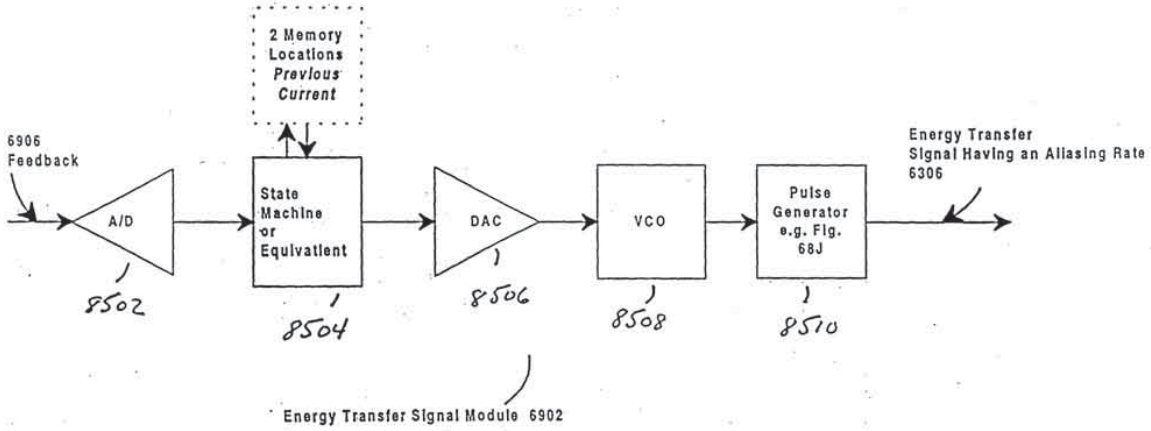
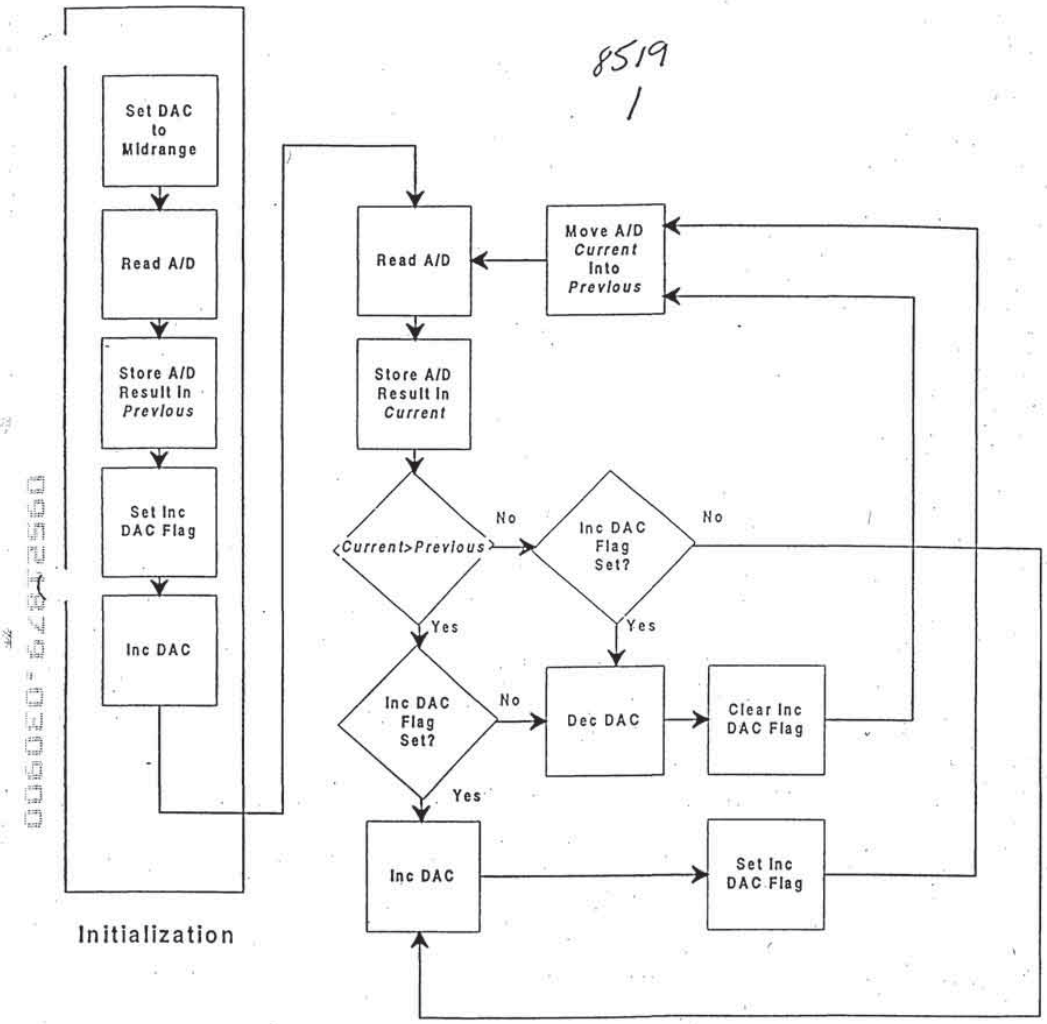


FIG. 85A

09521879.030900

1029

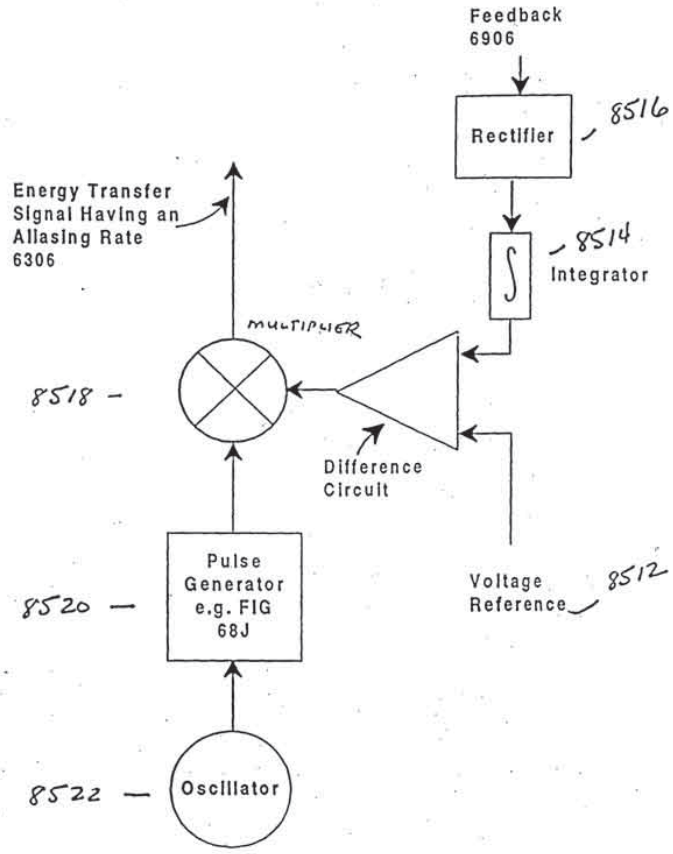
8519
1



State Machine Flowchart

5

FIG. 85B



Energy Transfer Signal Module 6902

FIG. 85C

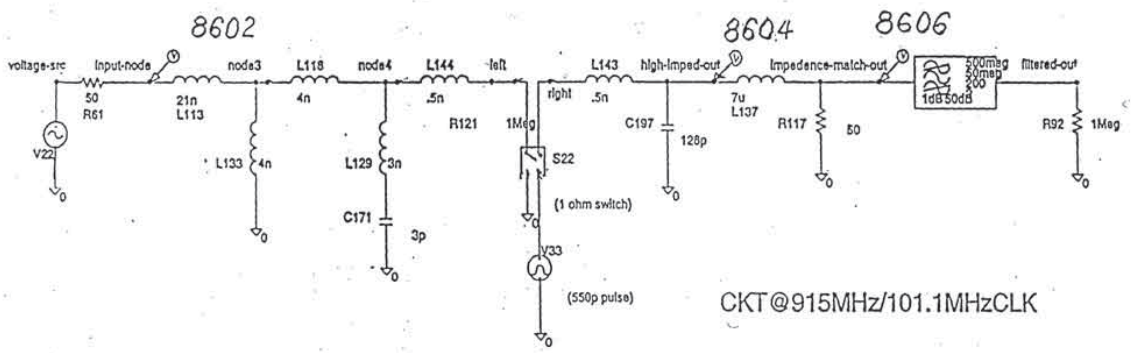


Fig 86

09521879.030900

1032

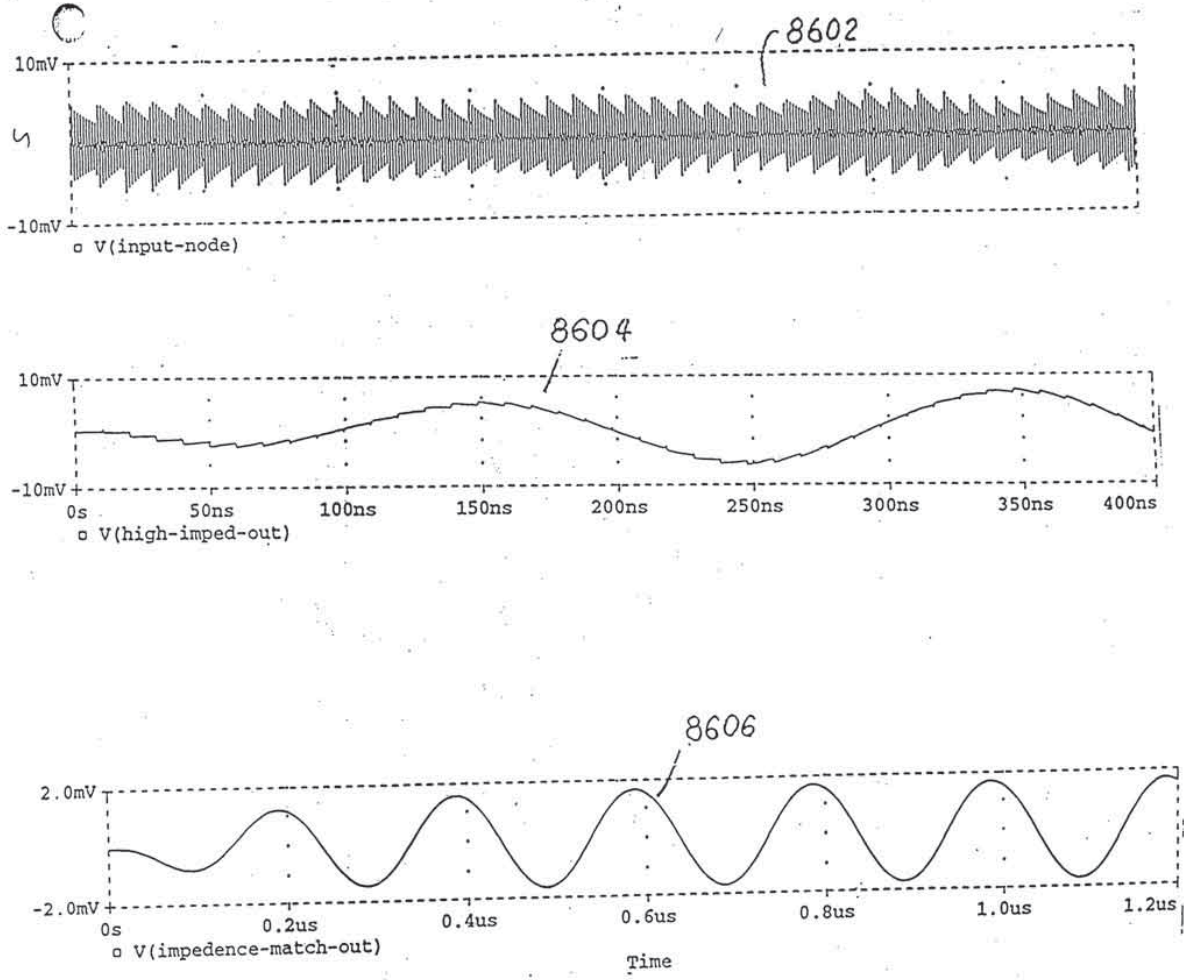


Fig 87

0521879.030900

1033

8812

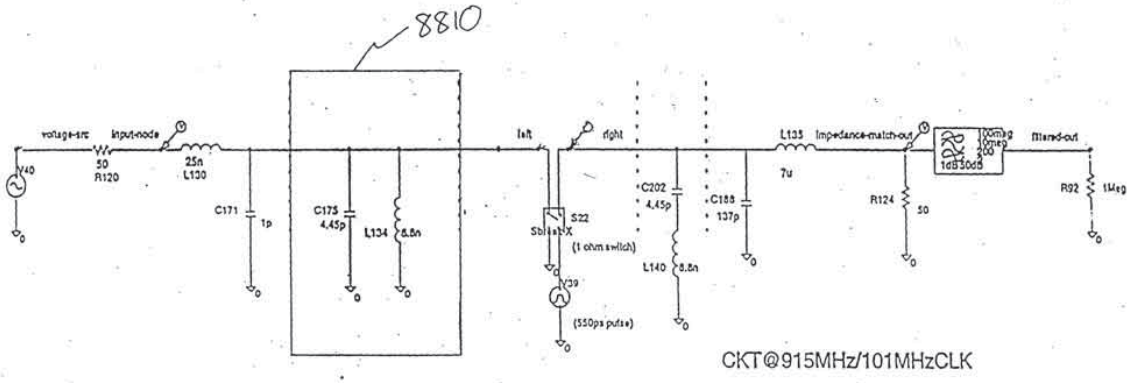


Fig 88

1034

09521879.030900

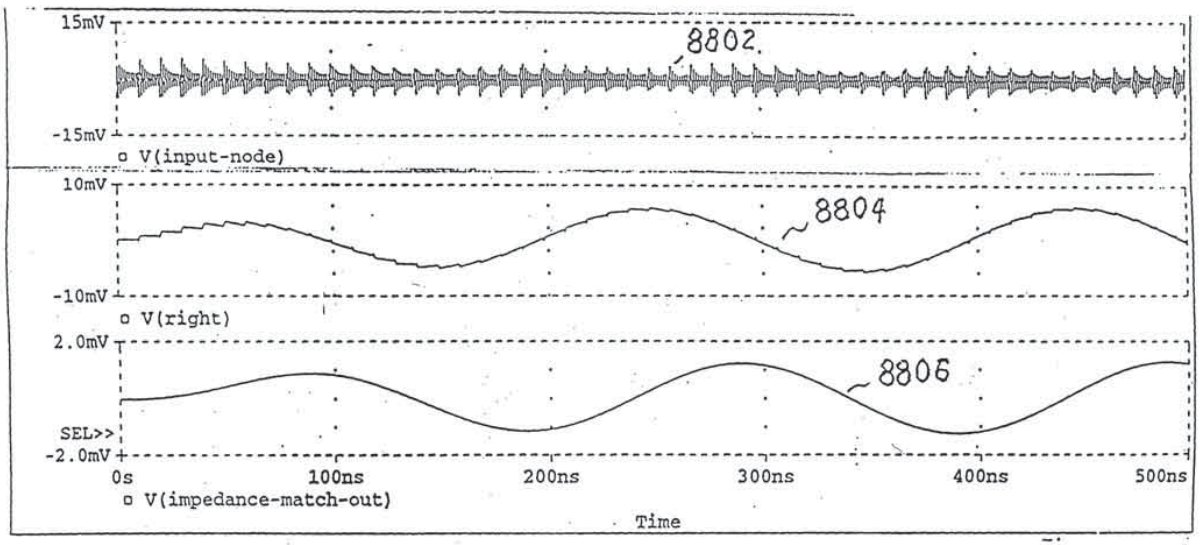


Fig 89

09521879.030900

1035

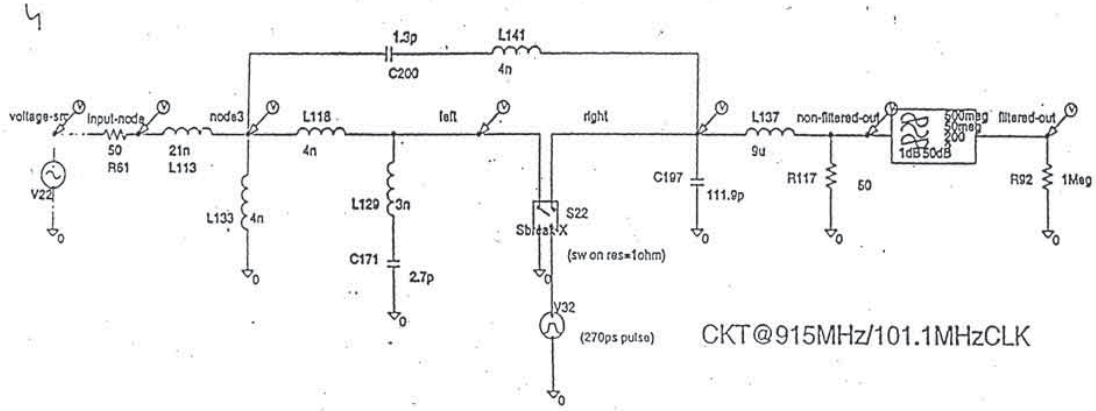


Fig 90

09521879.030900

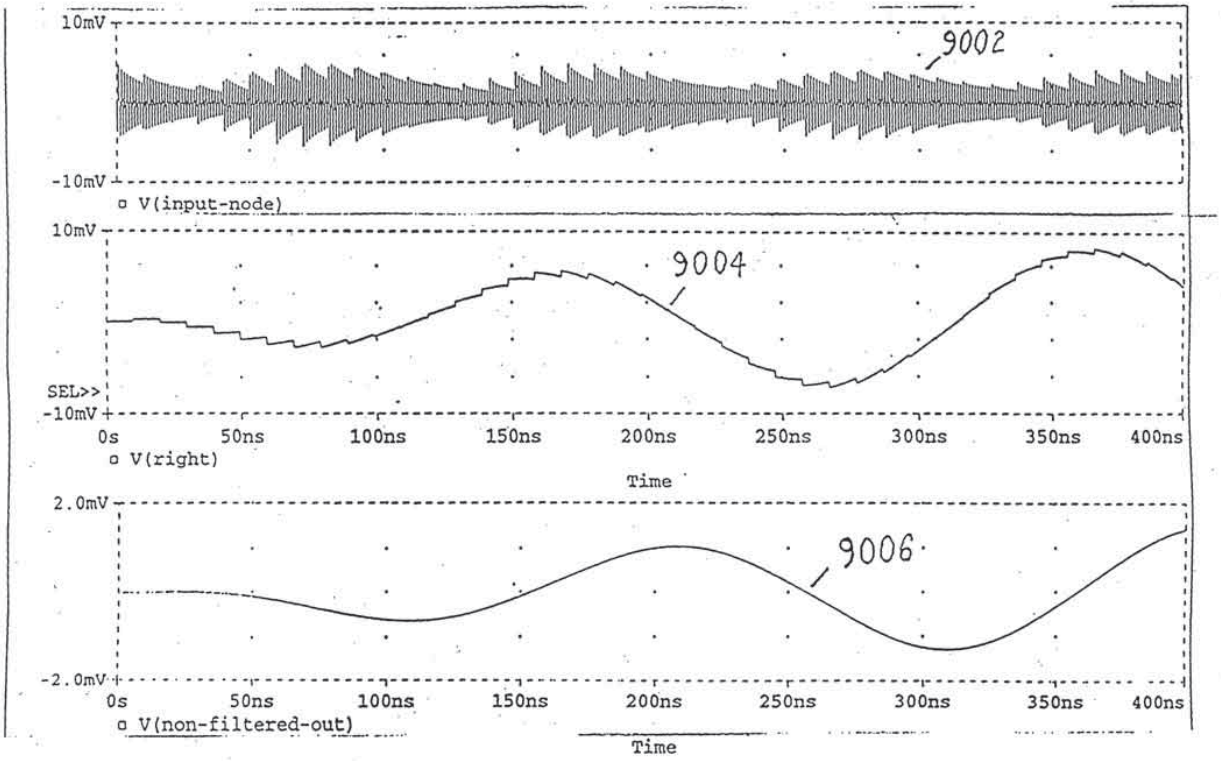


Fig 91

09521879.030900

1037

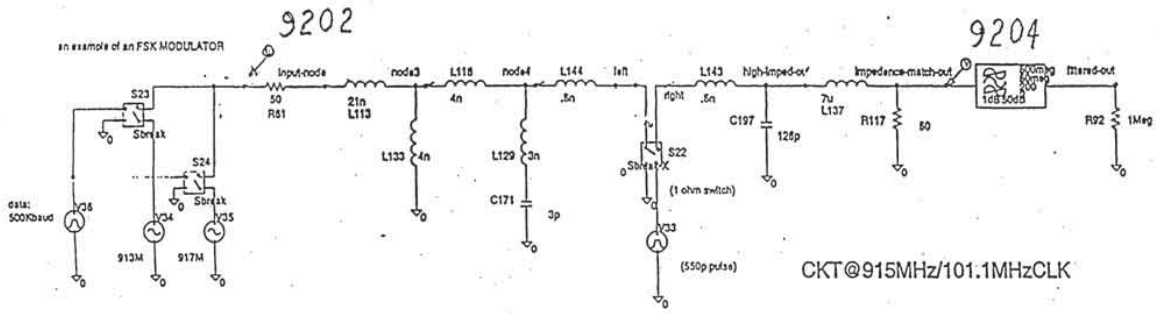


Fig 92

09521879.030900

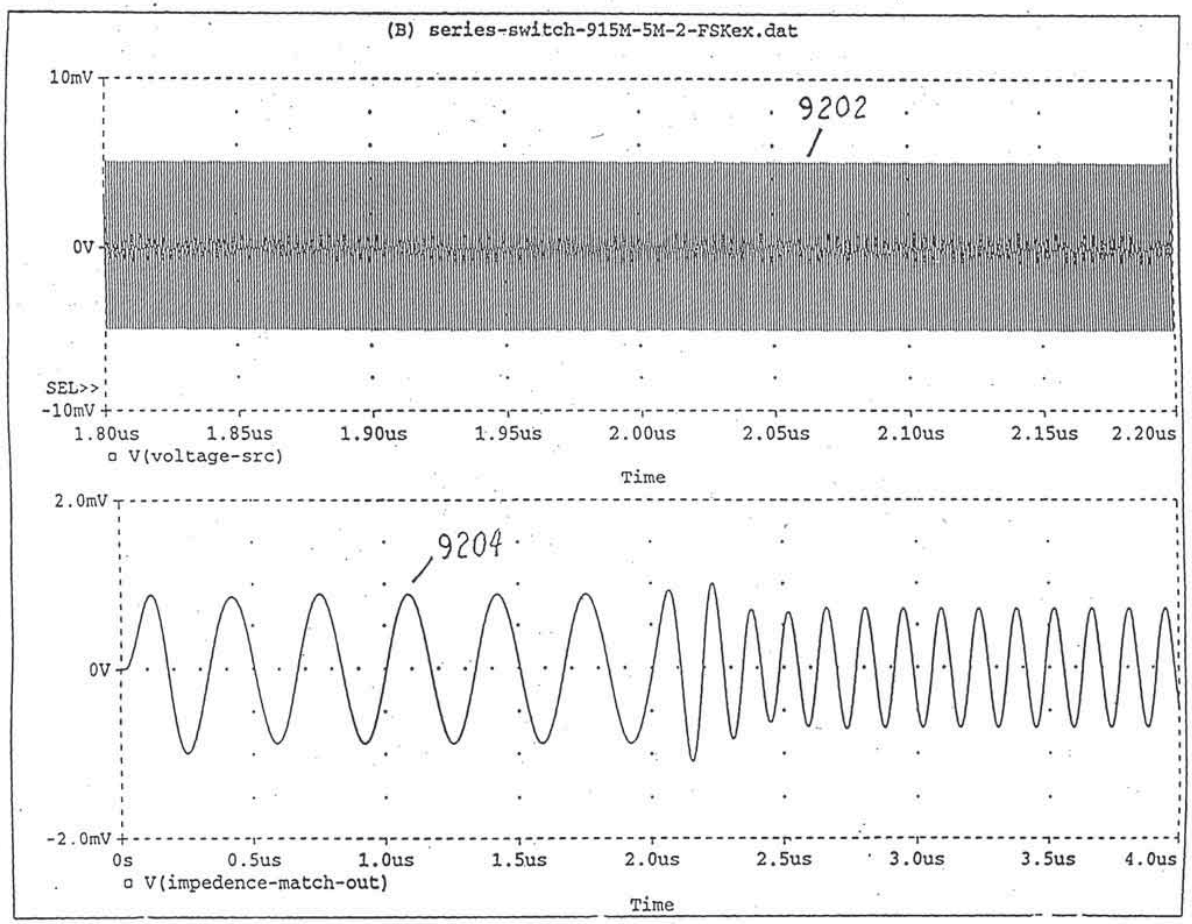


Fig 93

09521979.030900

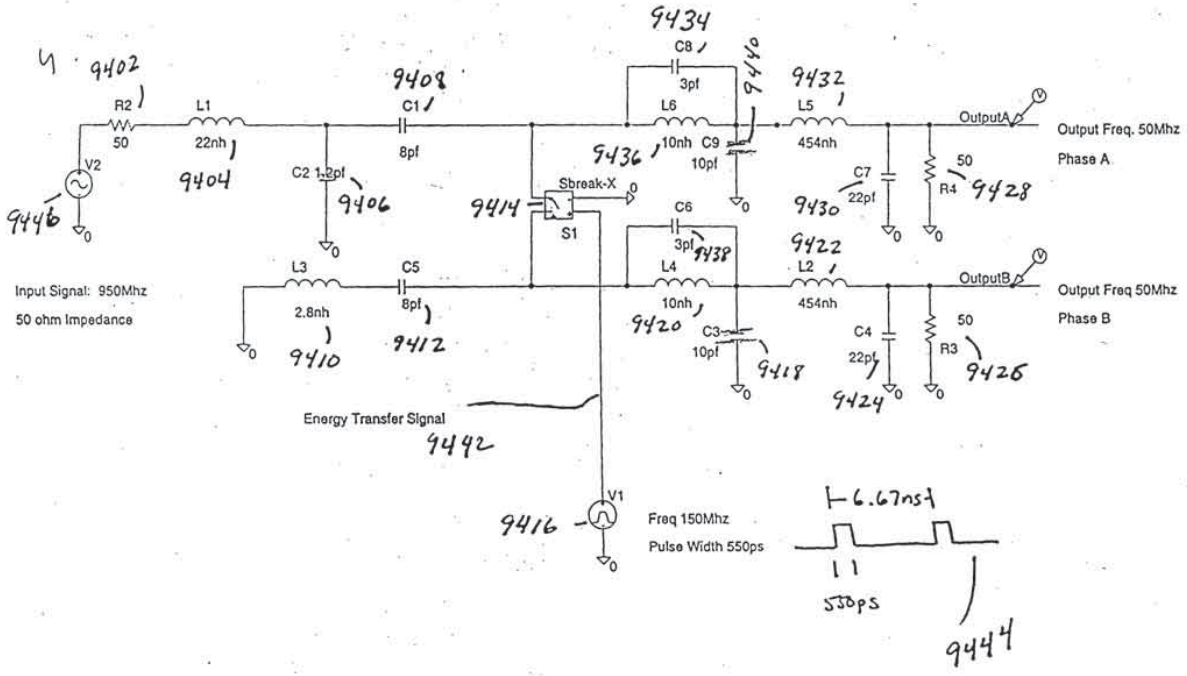


FIG. 94A

0521879.030000

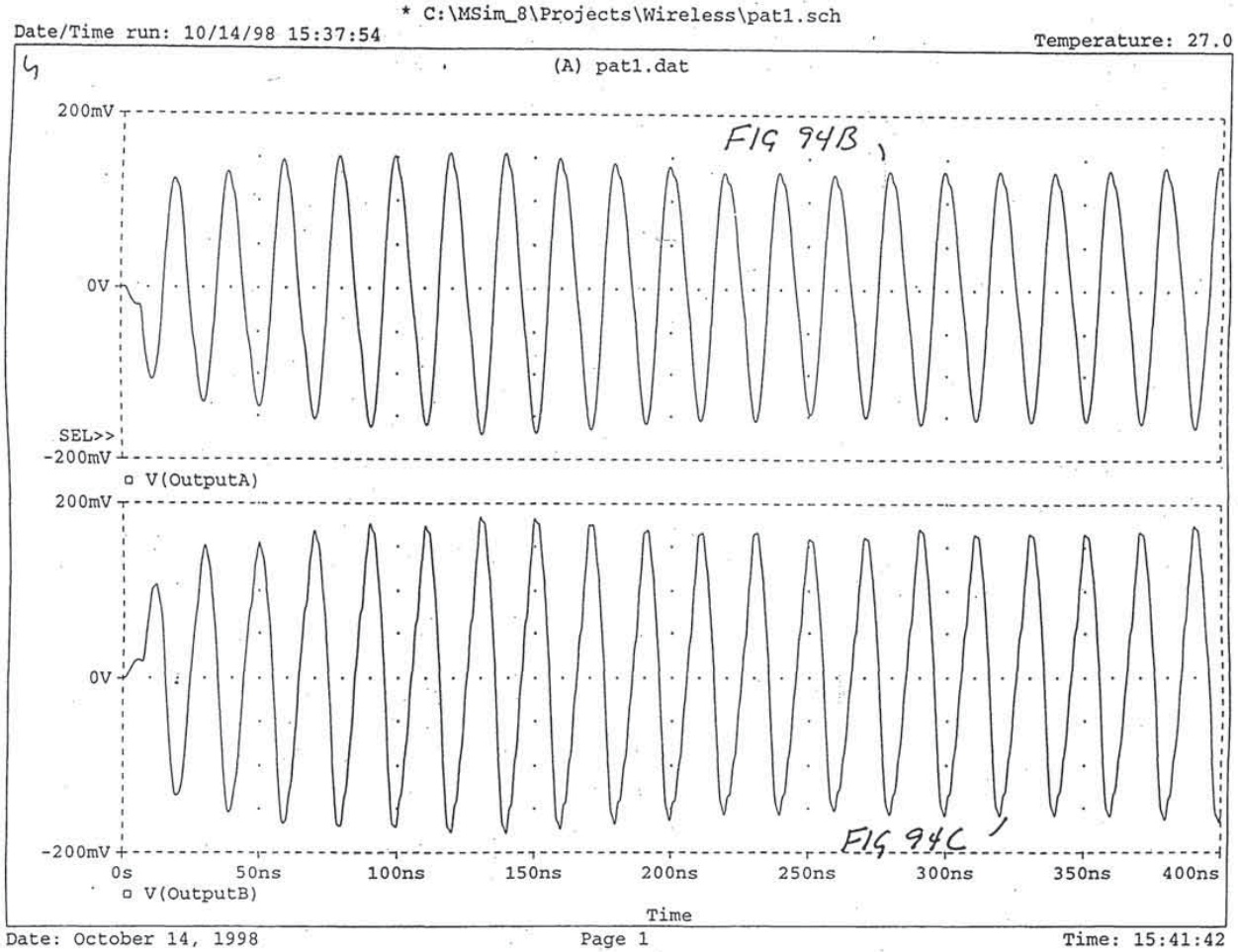


FIG 94B

FIG 94C

09521879.030900

1041

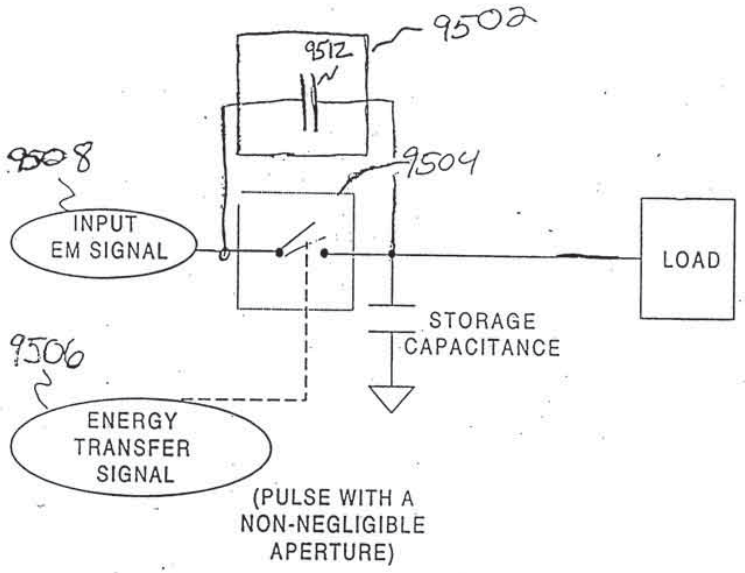

9502
9512
9504
9508
INPUT
EM SIGNAL
LOAD
STORAGE
CAPACITANCE
9506
ENERGY
TRANSFER
SIGNAL
(PULSE WITH A
NON-NEGLIGIBLE
APERTURE)

Fig 95

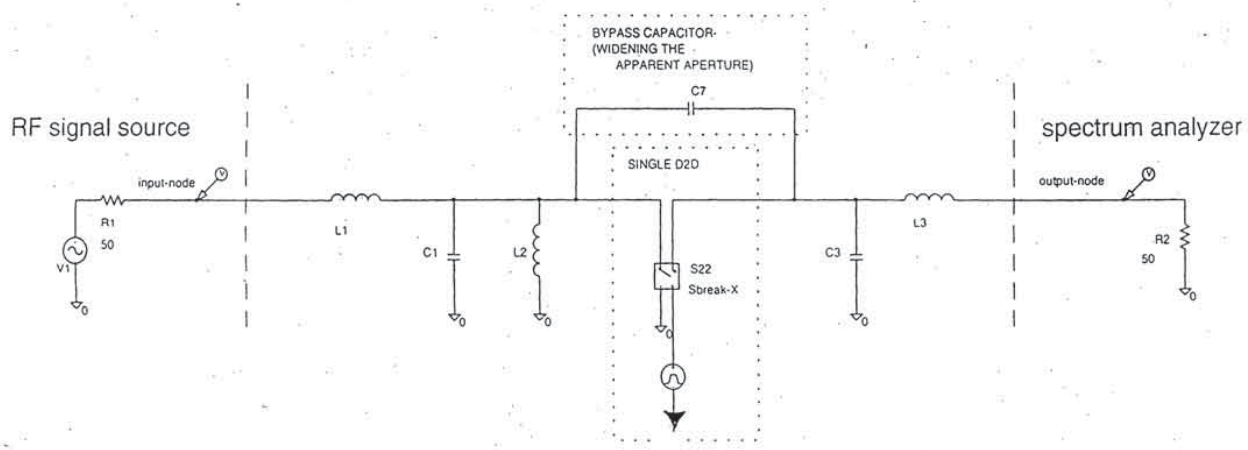


FIG. 96

09521879.030900

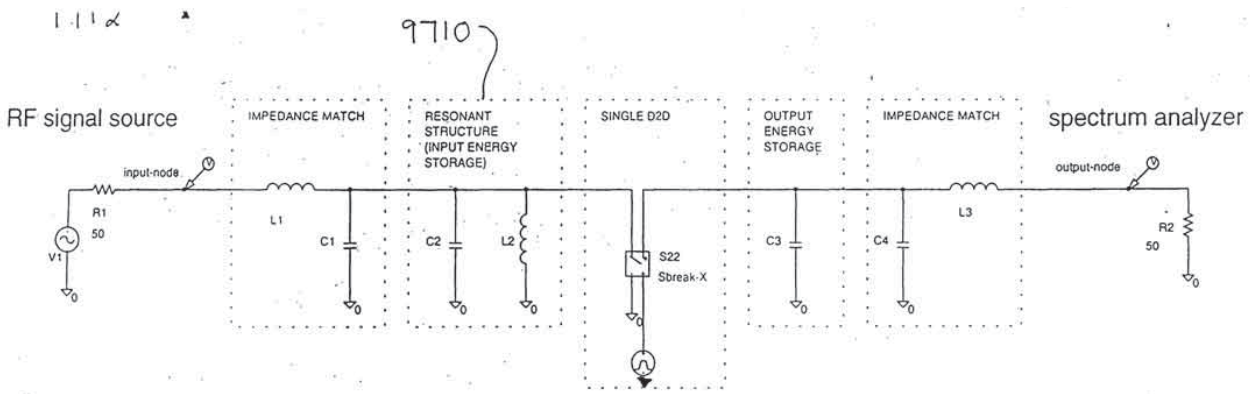

9710
RF signal source
IMPEDANCE MATCH
RESONANT STRUCTURE (INPUT ENERGY STORAGE)
SINGLE D2D
OUTPUT ENERGY STORAGE
IMPEDANCE MATCH
spectrum analyzer
input-node
output-node
R1
50
V1
L1
C1
C2
L2
S22
Sbreak-X
C3
C4
L3
R2
50

FIG. 97

1044

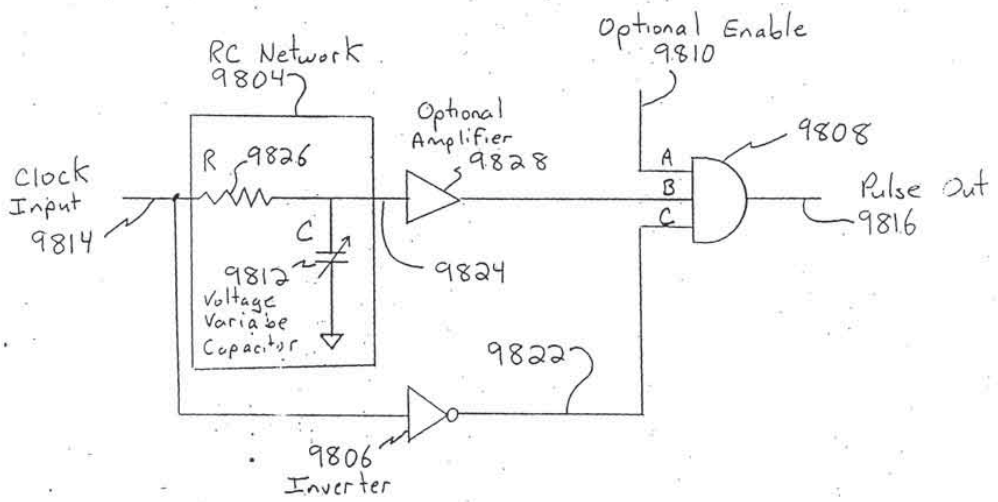


FIG. 98A

09521879.030900

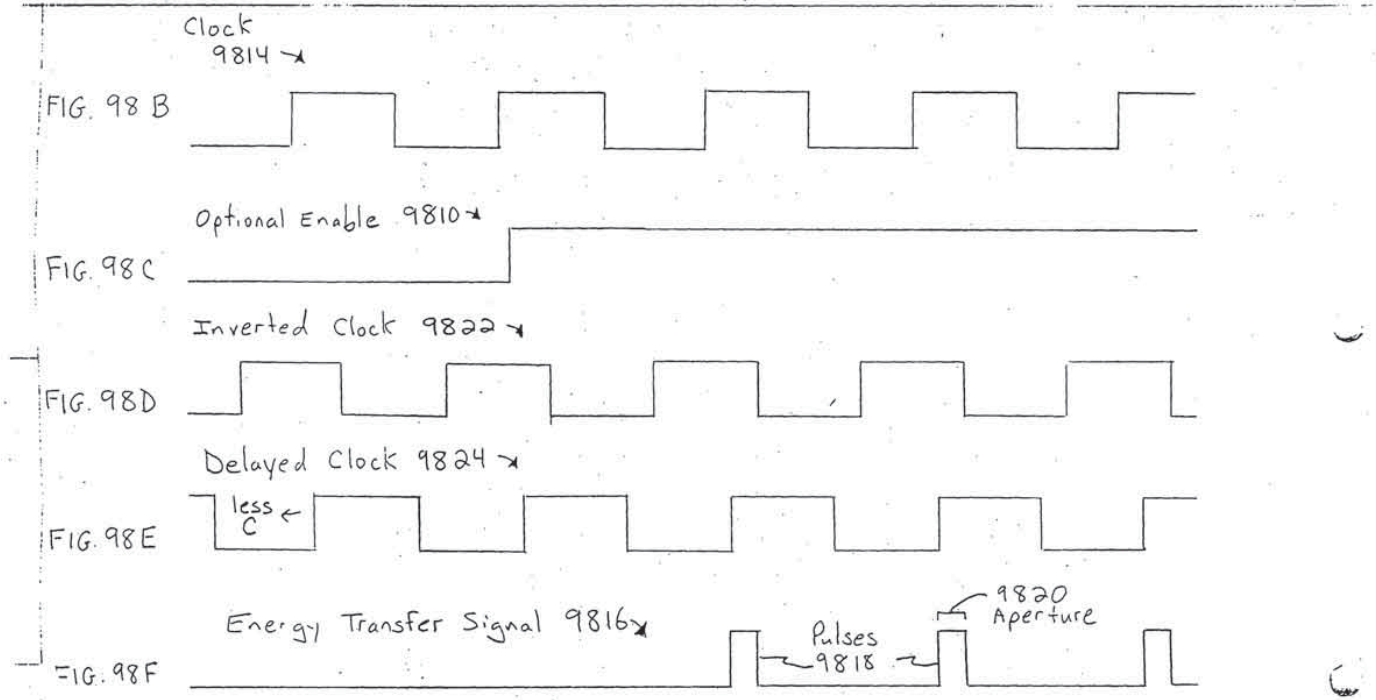


FIG. 98 B

FIG. 98 C

FIG. 98 D

FIG. 98 E

FIG. 98 F

09521979.030900

1046

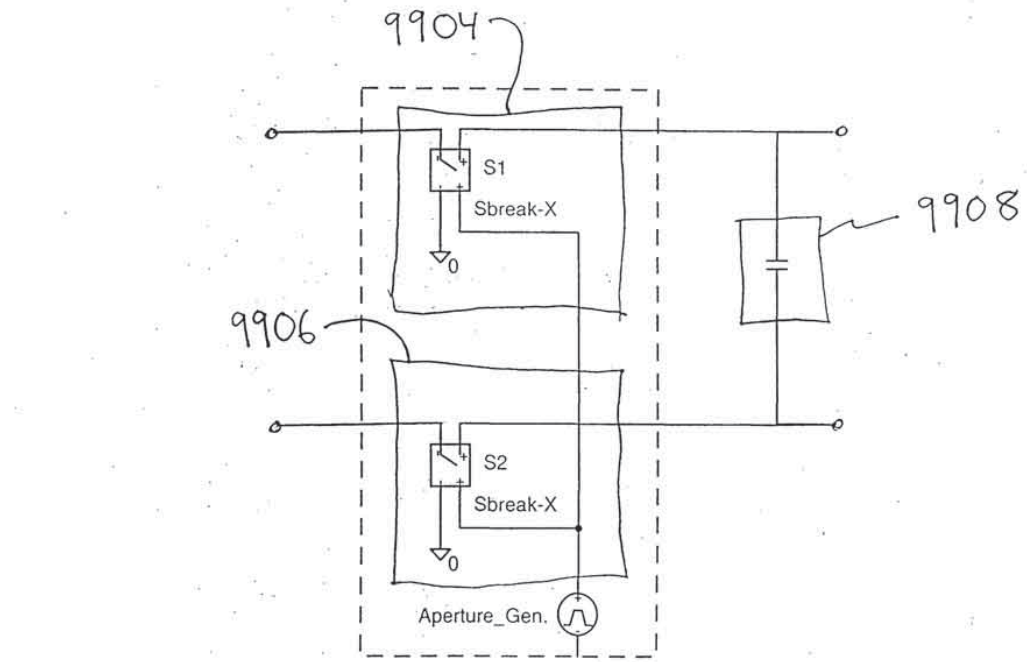


FIG 99

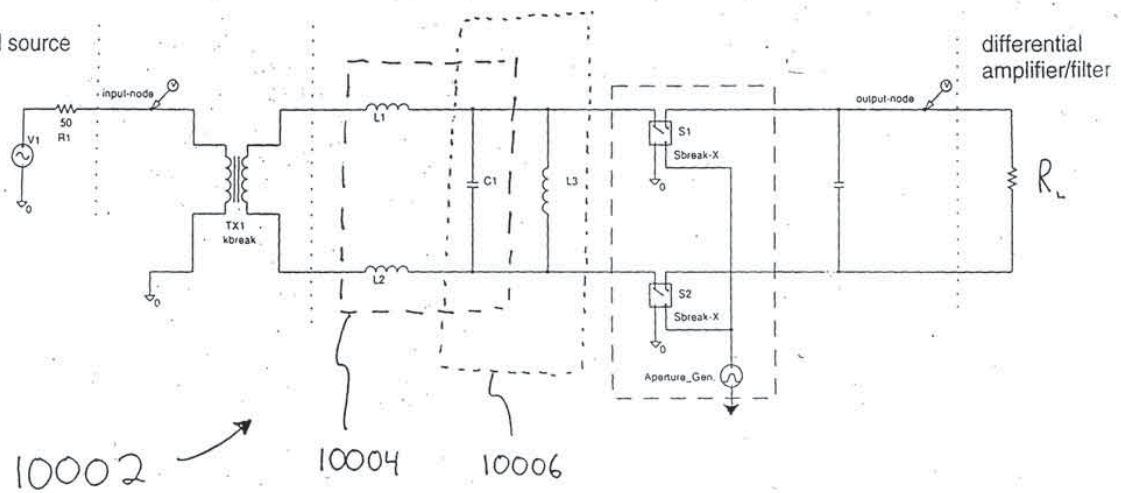


FIG. 100

09521979.030900

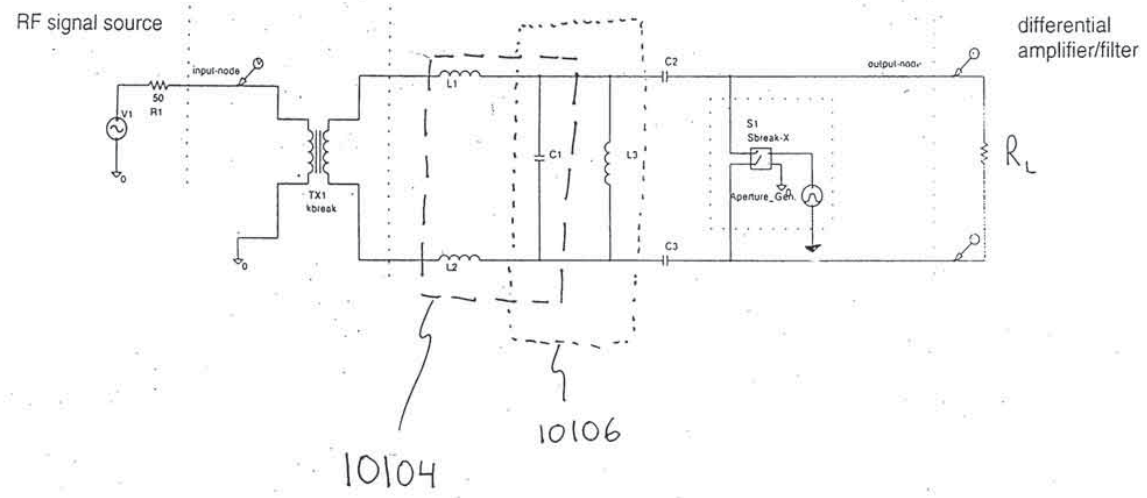

RF signal source
differential
amplifier/filter
input-node
output-node
50
R1
V1
L1
C2
C1
L3
S1
Sbreak-X
Aperture_Gen
R_L
TX1
kbreak
L2
C3
10104
10106
10102

FIG. 101

1049

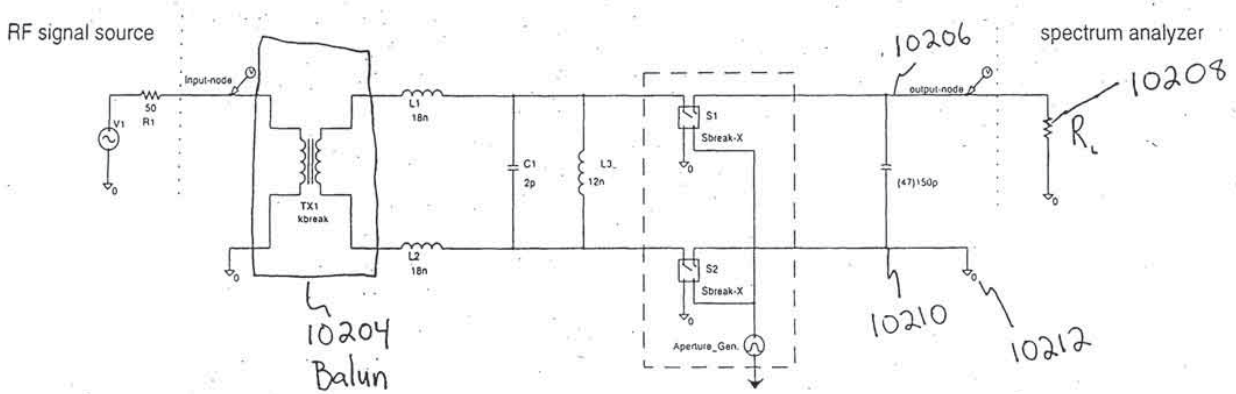
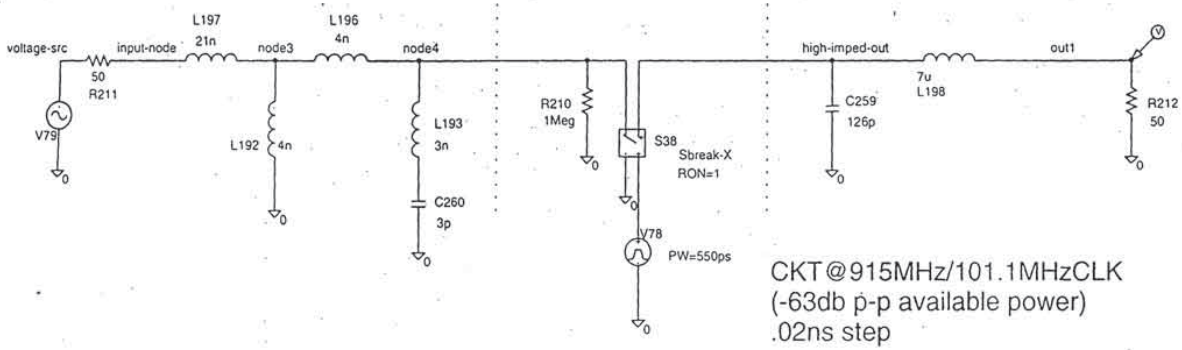


FIG. 102

09521879.030900



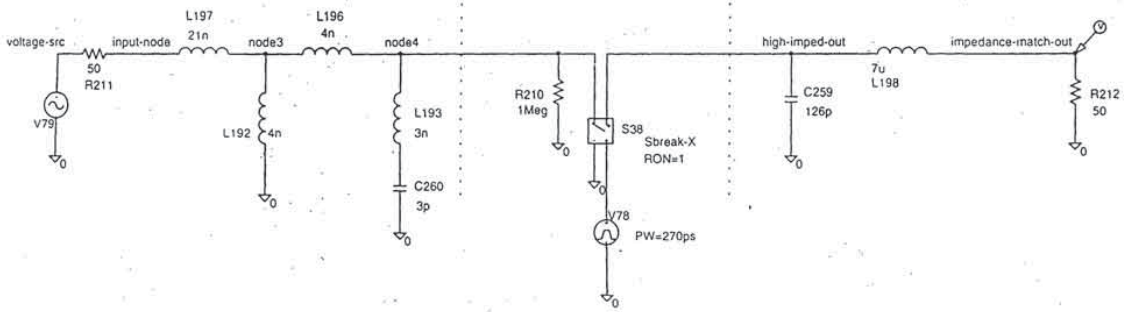
CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-915M-5M-hieff.sch

1051

Fig 103

09521879.030900



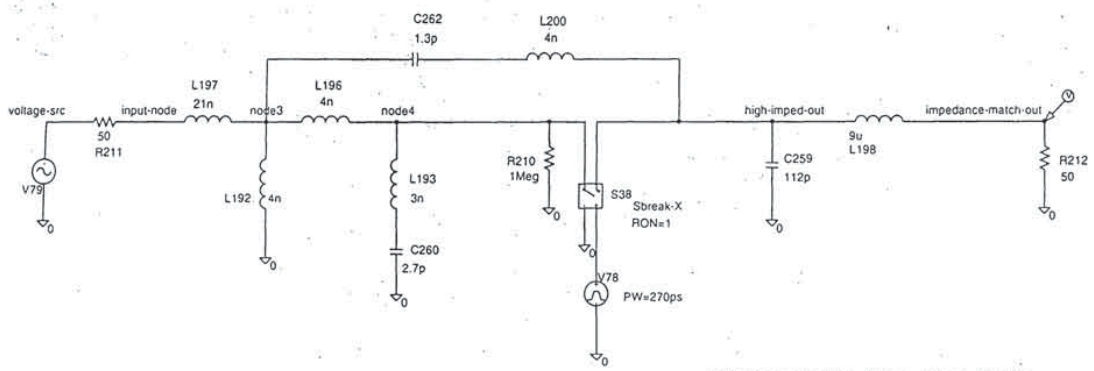
CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-smaperture915M-5M-hieff.sch

1052

FIG 104

09521979.030900



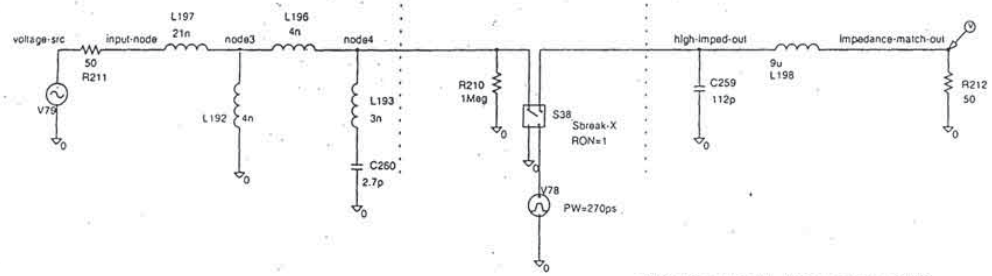
CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-bypass-915M-5M-hieff.sch

1053

FIG 105

095218P1.030900

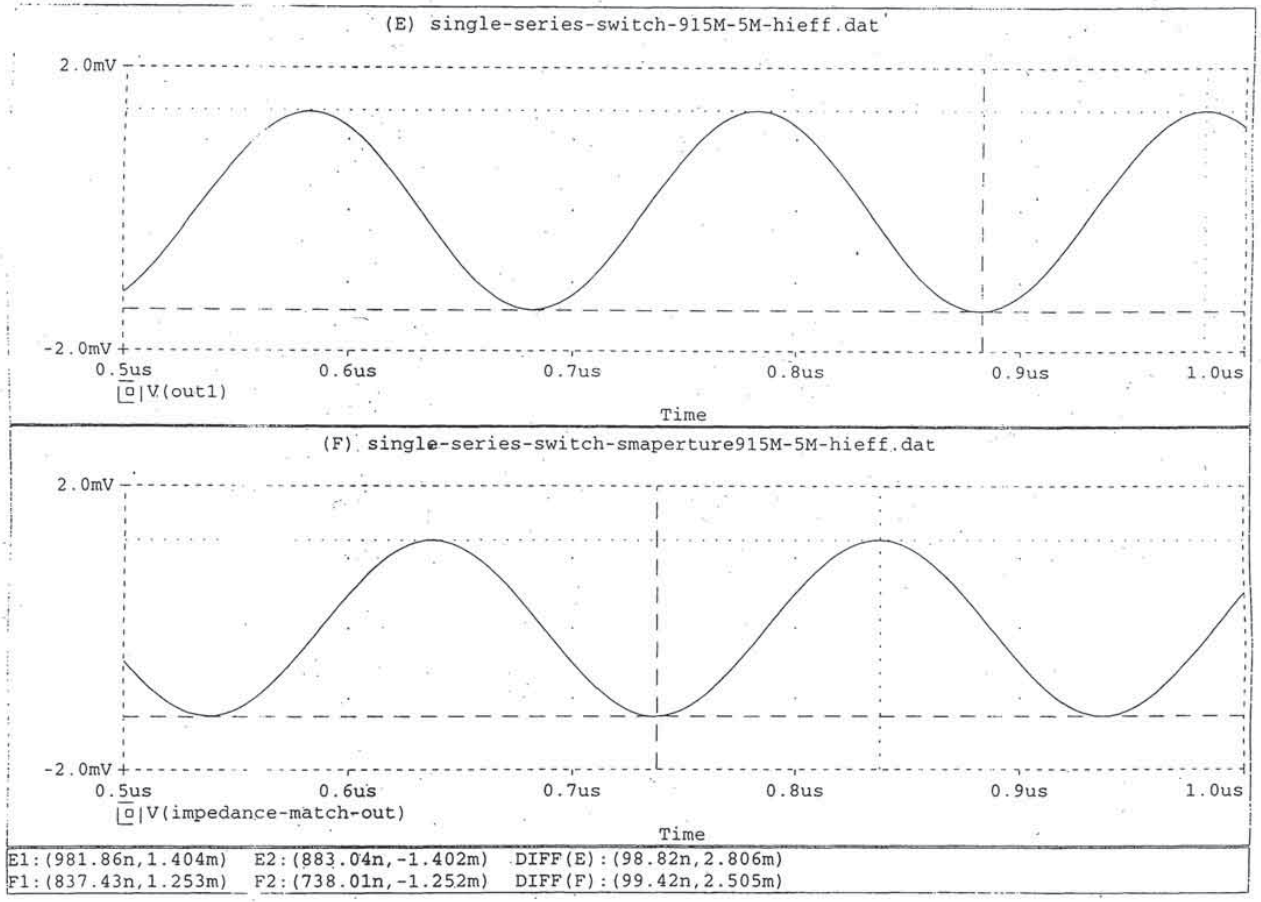


CKT@915MHz/101.1MHzCLK
(-63db p-p available power)
.02ns step

single-series-switch-wobypass-915M-5M-hieff.sch

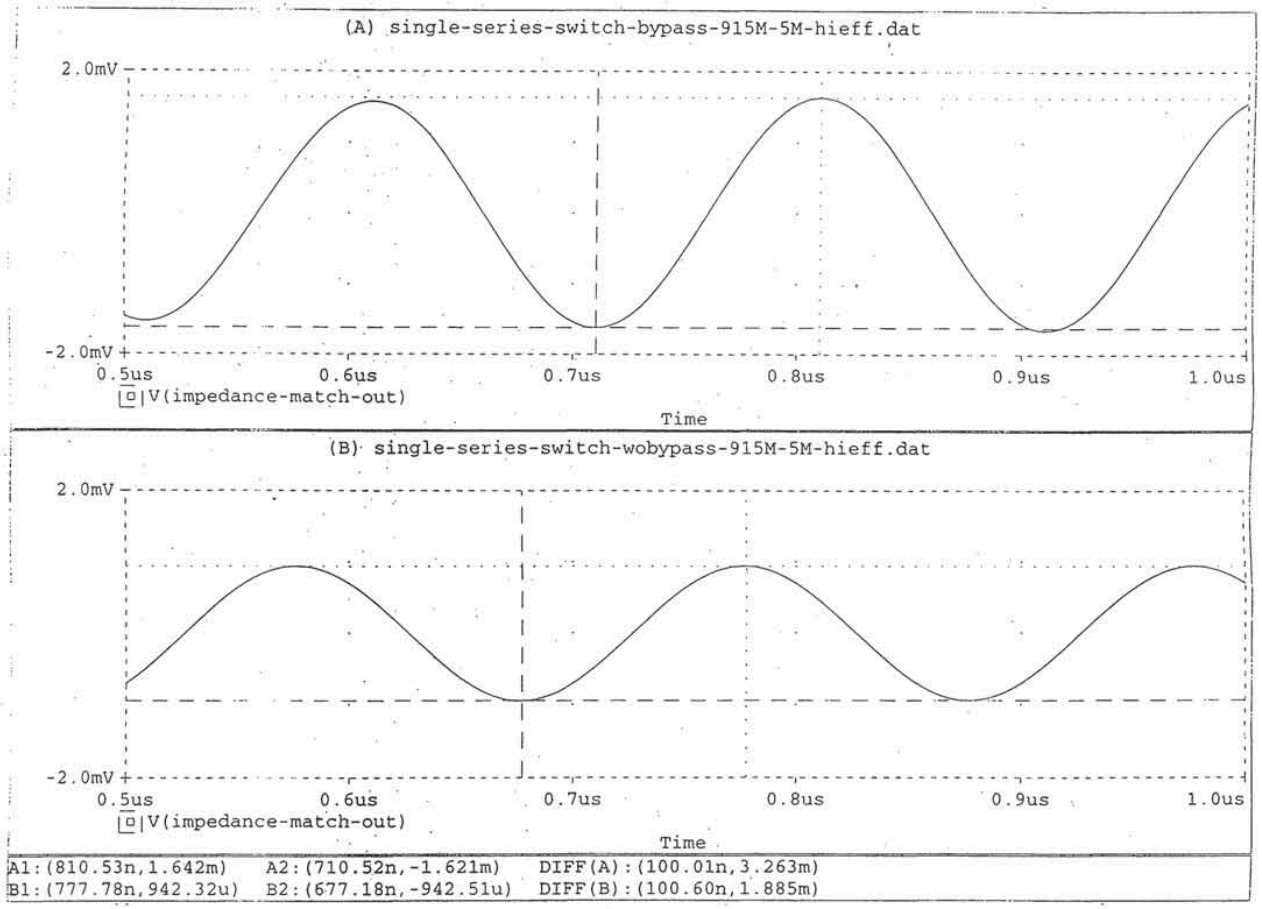
Fig 106

09521979.030900


(E) single-series-switch-915M-5M-hieff.dat
2.0mV
-2.0mV
0.5us
0.6us
0.7us
0.8us
0.9us
1.0us
V(out1)
Time
(F) single-series-switch-smaperture915M-5M-hieff.dat
2.0mV
-2.0mV
0.5us
0.6us
0.7us
0.8us
0.9us
1.0us
V(impedance-match-out)
Time
E1:(981.86n,1.404m) E2:(883.04n,-1.402m) DIFF(E):(98.82n,2.806m)
F1:(837.43n,1.253m) F2:(738.01n,-1.252m) DIFF(F):(99.42n,2.505m)

107 A

107 B



108
A

108
B

1056

09521879.030900

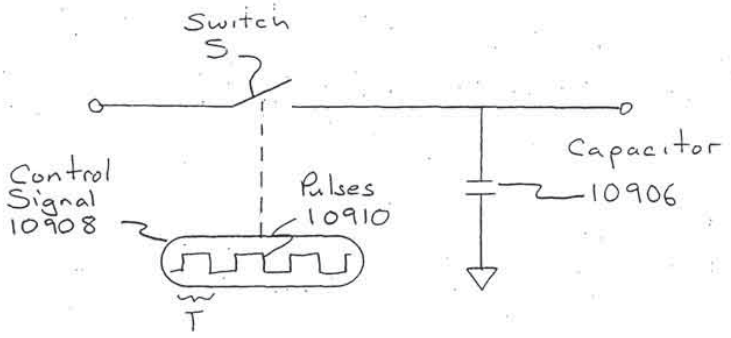

Switch
S
Capacitor
10906
Control
Signal
10908
Pulses
10910
T

FIG. 109A

$$q = C \cdot V \qquad \text{EQ. 10}$$

$$V = A \cdot \sin(t) \qquad \text{EQ. 11}$$

$$q(t) = C \cdot A \cdot \sin(t) \qquad \text{EQ. 12}$$

$$\Delta q(t) = C \cdot A \cdot \sin(t) - C \cdot A \cdot \sin(t - T) \qquad \text{EQ. 13}$$

$$\Delta q(t) = C \cdot A \cdot (\sin(t) - \sin(t - T)) \qquad \text{EQ. 14}$$

$$\sin(\alpha) - \sin(\beta) = 2 \cdot \sin\left(\frac{\alpha - \beta}{2}\right) \cdot \cos\left(\frac{\alpha + \beta}{2}\right) \qquad \text{EQ. 15}$$

$$\Delta q(t) = 2 \cdot C \cdot A \cdot \sin\left[\frac{t - (t - T)}{2}\right] \cdot \cos\left[\frac{t + (t - T)}{2}\right] \qquad \text{EQ. 16}$$

$$\Delta q(t) = 2 \cdot C \cdot A \cdot \sin\left(\frac{1}{2} \cdot T\right) \cdot \cos\left(t - \frac{1}{2} \cdot T\right) \qquad \text{EQ. 17}$$

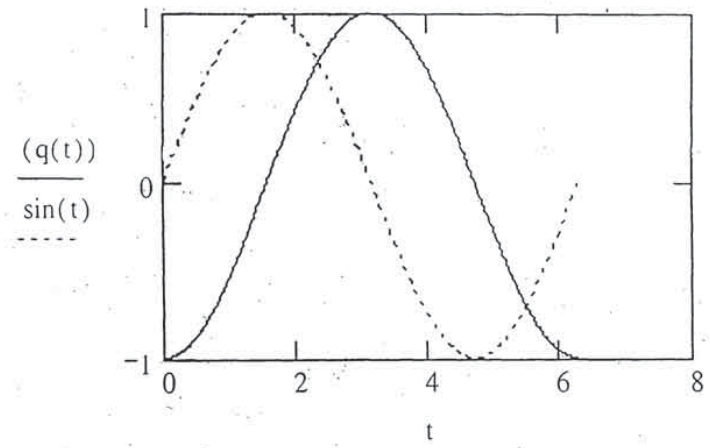
$$q(t) = \int_{\bullet}^{\bullet} C \cdot A \cdot (\sin(t) - \sin(t - T))\, dt \qquad \text{EQ. 18}$$

$$q(t) = -\cos(t) \cdot C \cdot A + \cos(t - T) \cdot C \cdot A \qquad \text{EQ. 19}$$

$$q(t) = C \cdot A \cdot (\cos(t - T) - \cos(t)) \qquad \text{EQ. 20}$$

FIG. 109B

0060420 "6281560



Graph 1

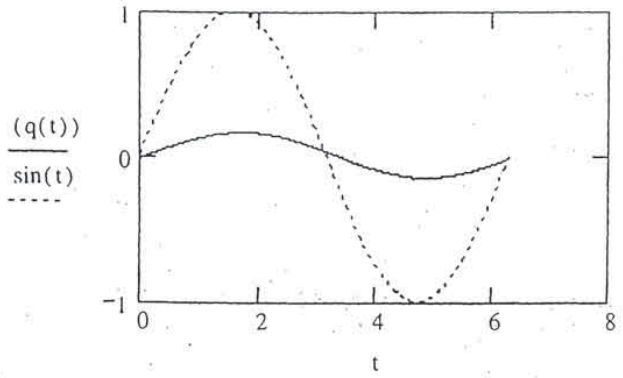
C=1;A=.5,T=¶

FIG. 109C

09521879.030900

1059

For Graph 2: C=1, A=.5, T=π/10:



Graph 2

FIG. 109D

Power - Charge Relationship

$$q = C \cdot V \qquad \text{EQ. 21}$$

$$V = \frac{q}{C} \qquad \text{EQ. 22}$$

$$V = \frac{J}{C} \qquad \text{EQ. 23}$$

$$J = \frac{q^2}{C} \qquad \text{EQ. 24}$$

$$P = \frac{J}{S} \qquad \text{EQ. 25}$$

$$P = \frac{q^2}{C \cdot S} \qquad \text{EQ. 26}$$

FIG. 109E

Insertion Loss

Insertion loss in dB is expressed by:

$$ILdB = 10 \cdot \log \left(\frac{Pin}{Pout} \right)$$

or

$$ILdB = 10 \cdot \log \left[\frac{\left(\frac{Vin^2}{Rin} \right)}{\left(\frac{Vout^2}{Rout} \right)} \right]$$

FIG. 109F

Aliasing signal 11014
EM signal 11002
11006
S
G
D
11004
11008
11010
11000
C
Down-converted signal 11012

FIG 10A

FIG 1108

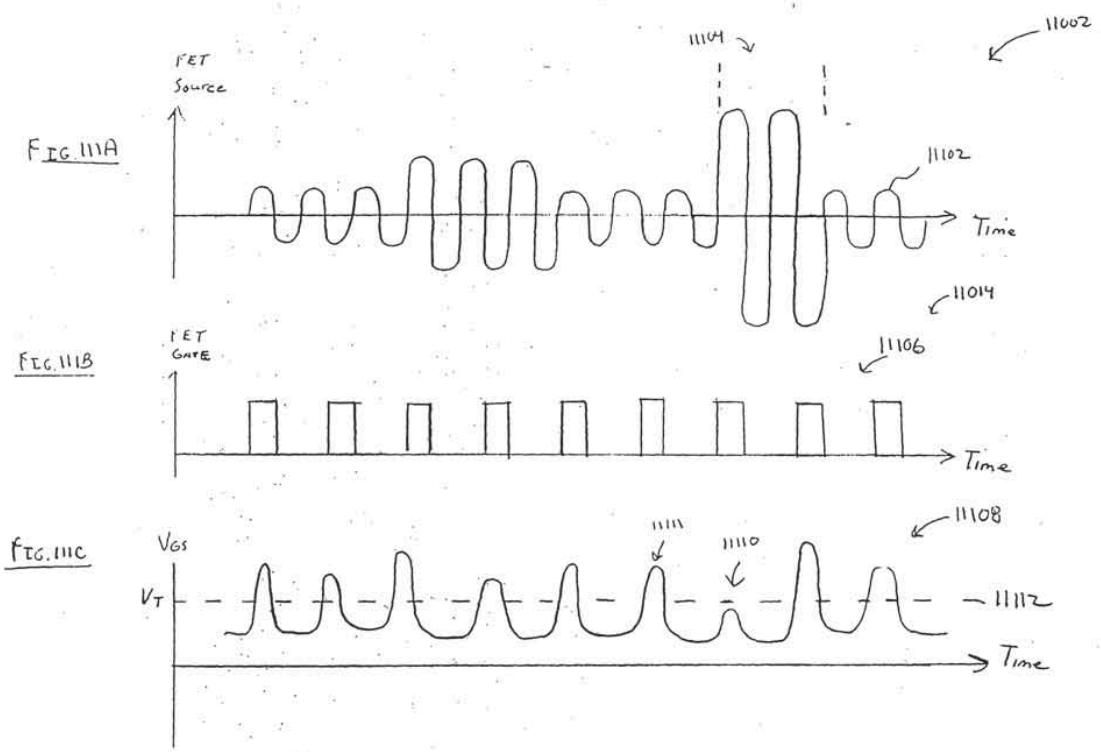


FIG. 11A

FIG. 11B

FIG. 11C

09521879.030900

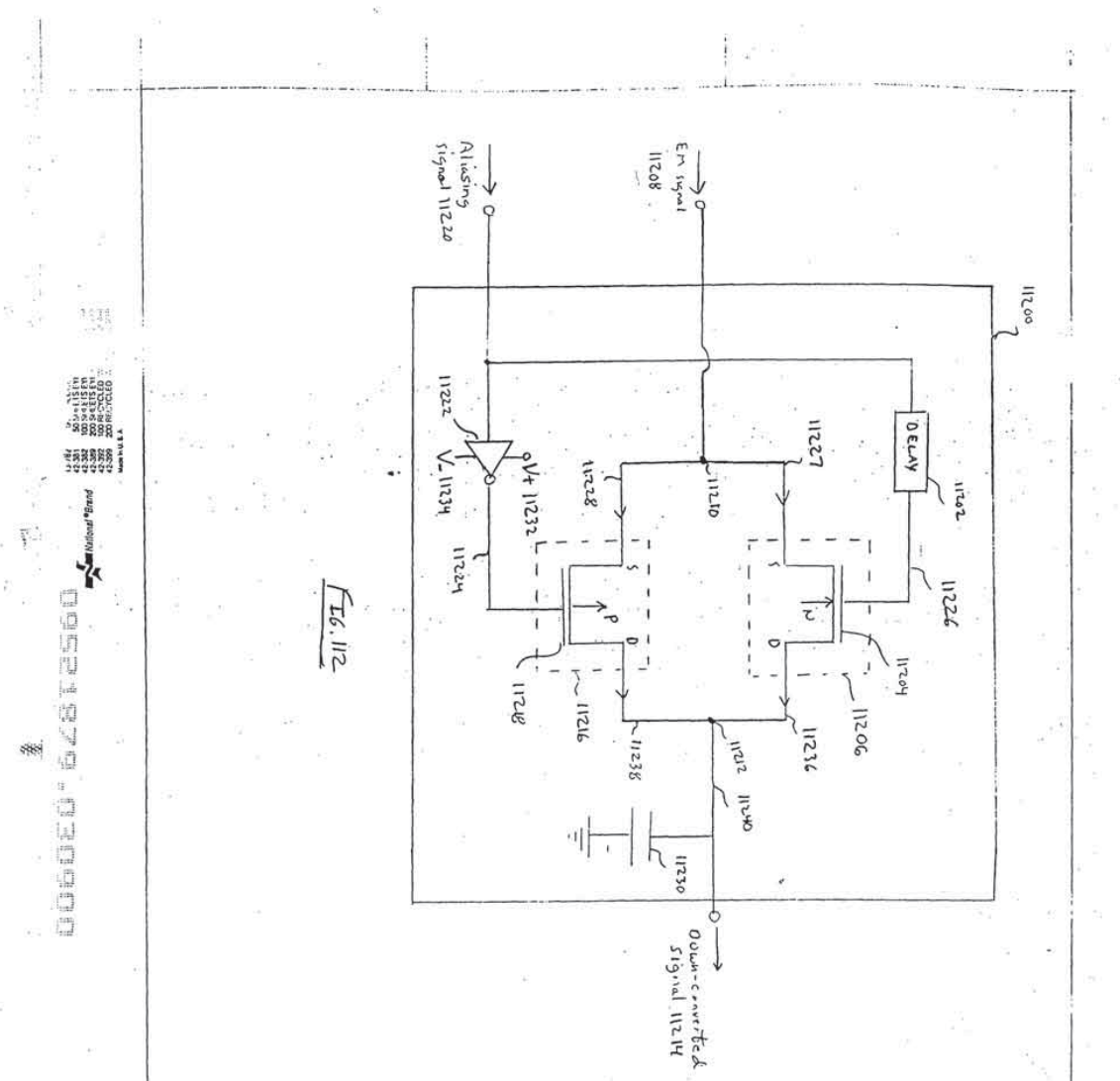
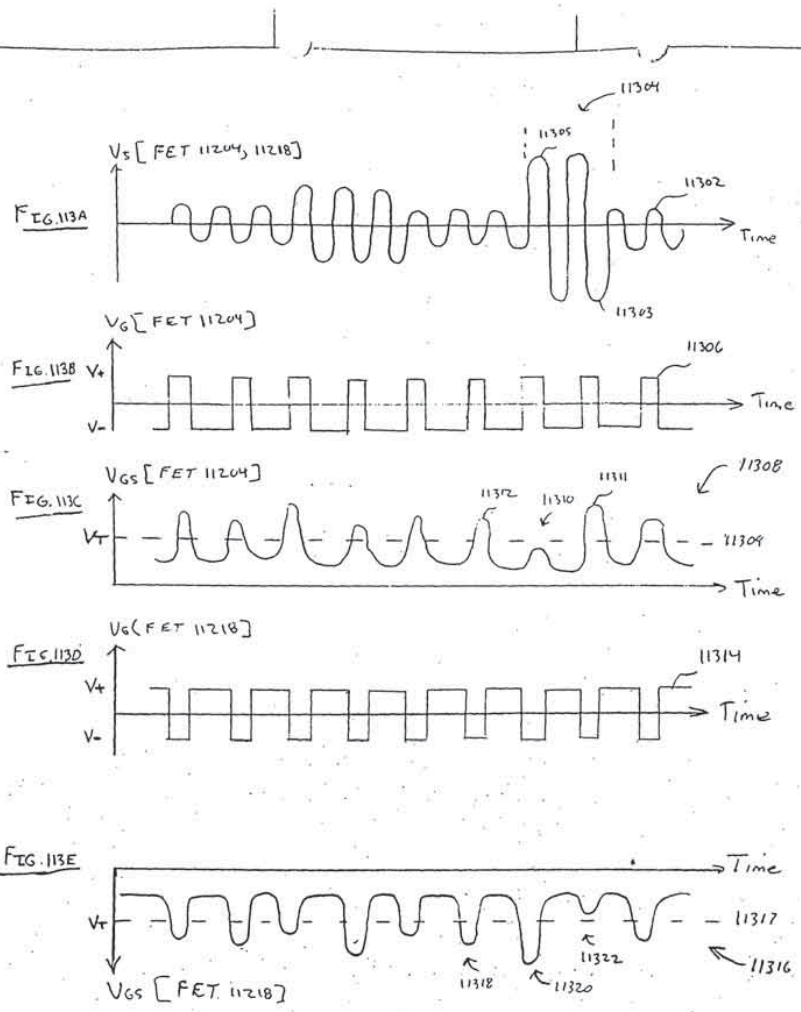

11200
Aliasing signal 11220
EN signal 11208
11222
V_ 11234
0V+ 11232
11224
11228
11227
11210
DELAY
11202
11226
11204
11206
11216
11212
11240
11230
11238
11218
11214
Down-converted signal 11214

FIG. 112


FIG. 113A
V_S [FET 11204, 11218]
11304
11305
11302
11303
Time
FIG. 113B
V_G [FET 11204]
V_+
V_-
11306
Time
FIG. 113C
V_{GS} [FET 11204]
11308
11312
11310
11311
V_T
11309
Time
FIG. 113D
V_G (FET 11218]
11314
V_+
V_-
Time
FIG. 113E
Time
V_T
11317
11322
11316
11318
11320
V_{GS} [FET 11218]

Aliasing signal 11220
En signal 11208
V+ 11202
11204
11206
11210
11212
11214
11216
11218
11220
11222
11224
11226
11227
11228
11230
11232
11234
11236
11238
DELAY
340
Output-converted signal 11214

Fig. 11A

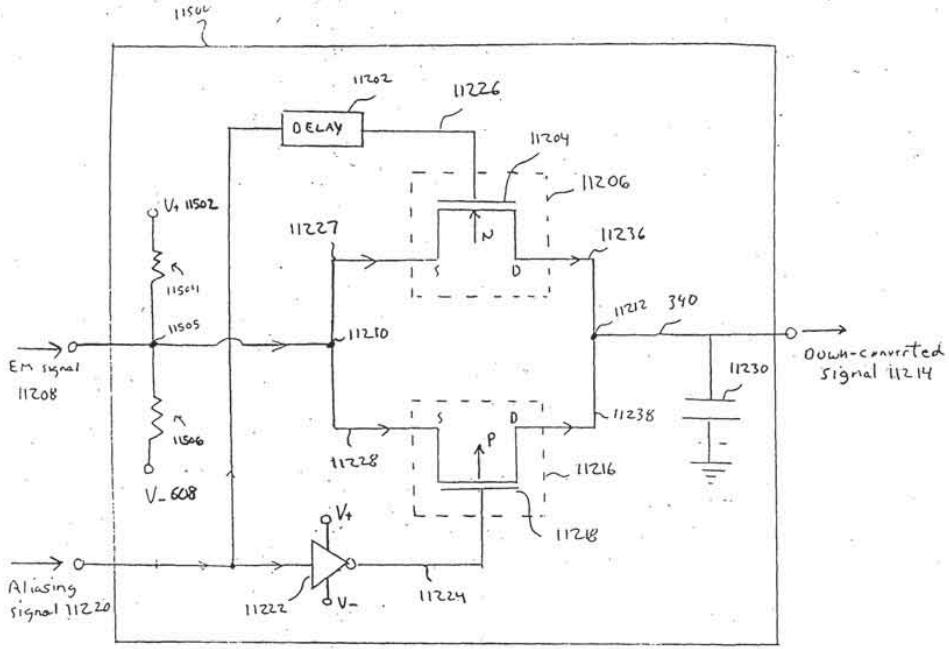


FIG. 115

09521879.030900

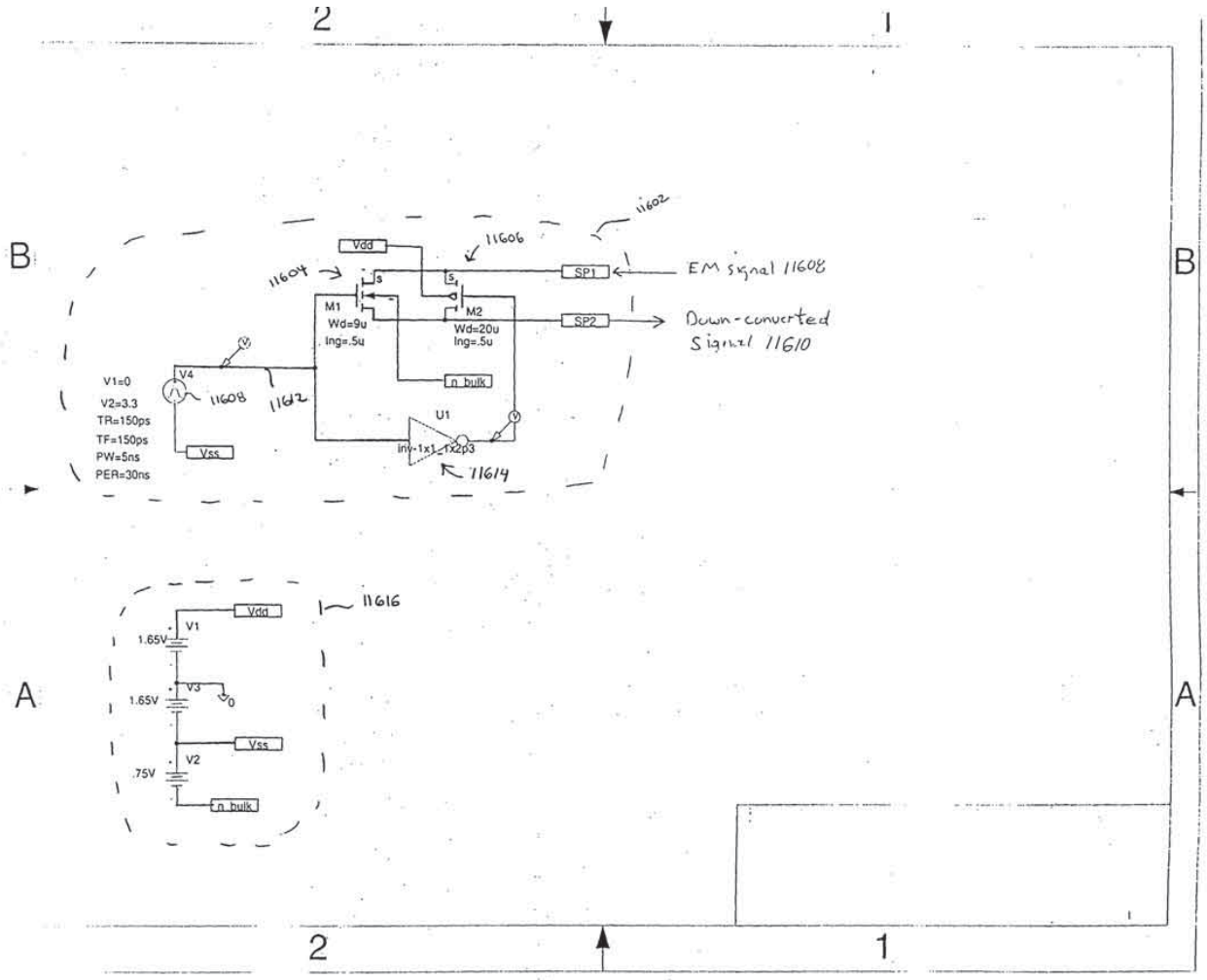


FIG. 116

09521879.030900

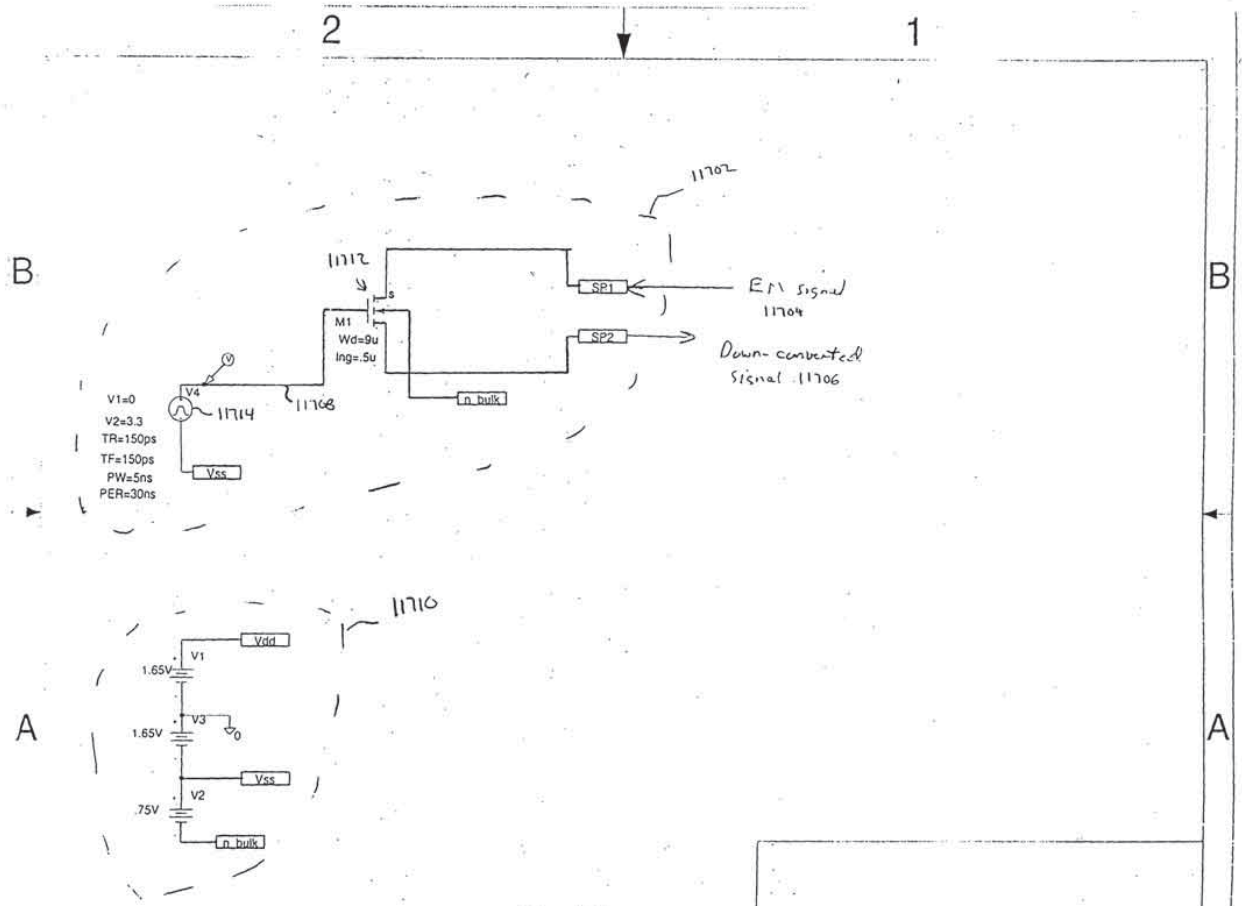

2
1
B
A
11702
11712
M1
Wd=9u
lng=.5u
SP1
SP2
EN signal
11704
Down-converted
Signal 11706
n_bulk
V4
11714
11708
V1=0
V2=3.3
TR=150ps
TF=150ps
PW=5ns
PER=30ns
Vss
11710
Vdd
V1
1.65V
V3
1.65V
Vss
V2
.75V
n_bulk
Revision: -
myfile.sch
Page 1 of 1

FIG. 117

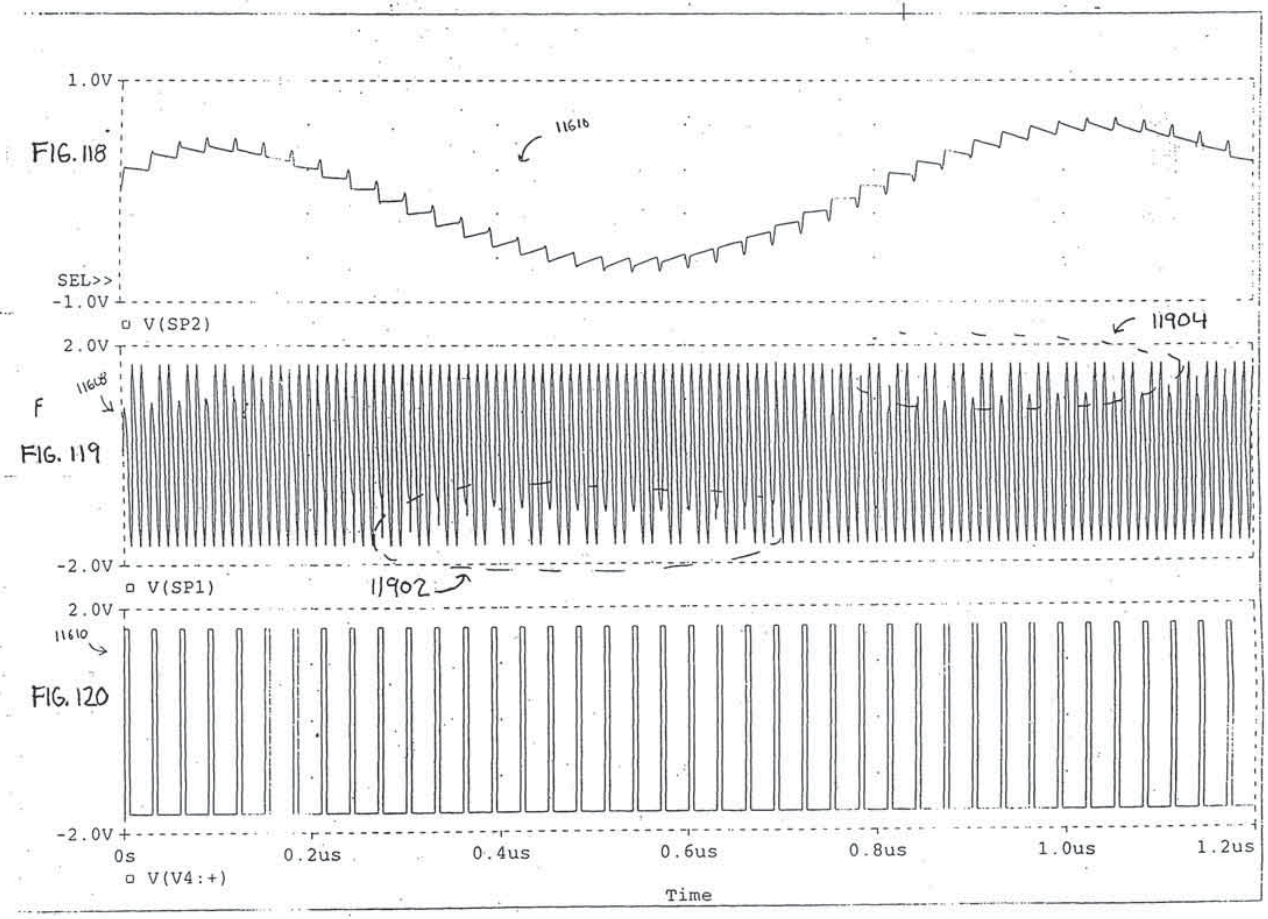


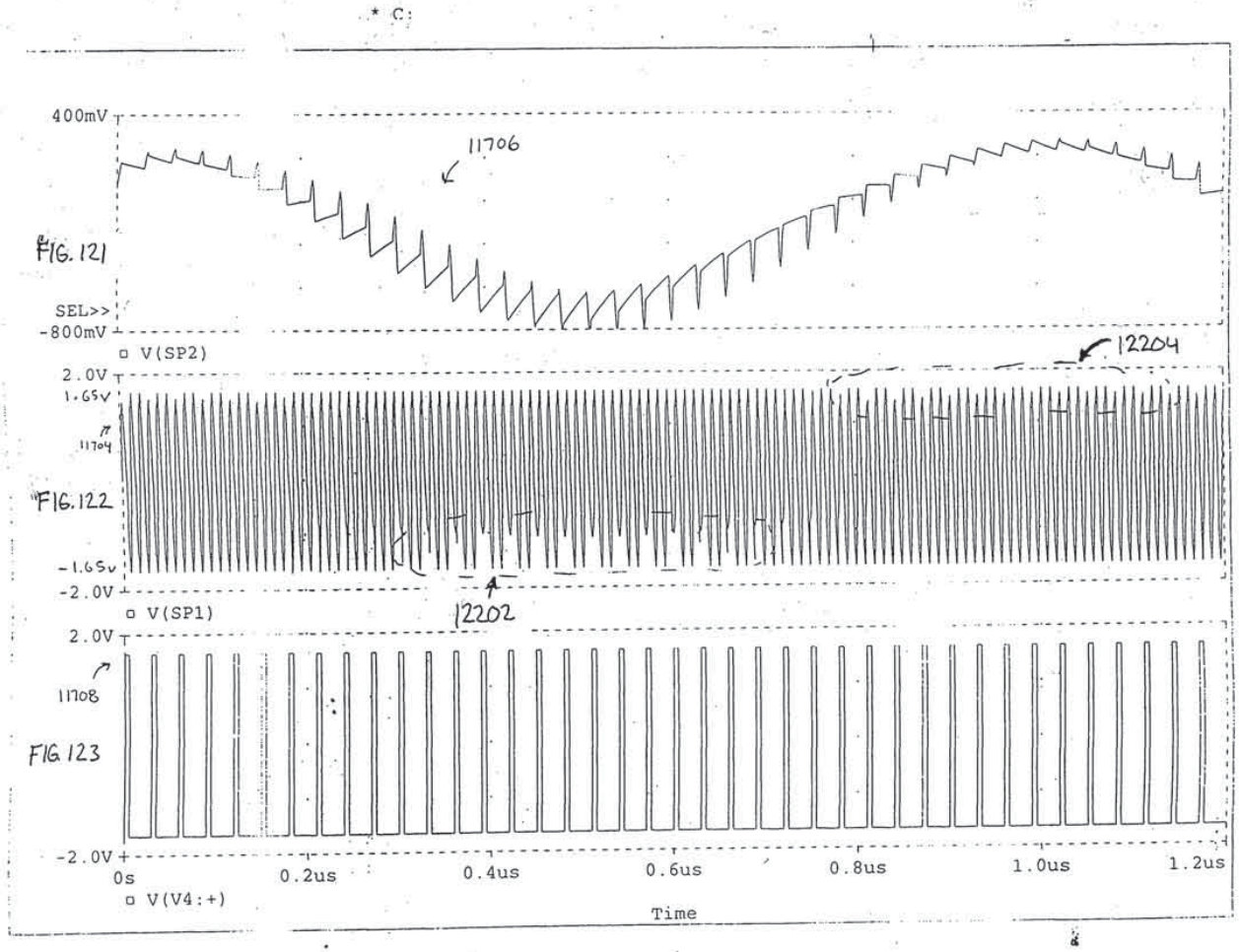
FIG. 118

FIG. 119

FIG. 120

09521879.030900

1072



0052197 9.030900

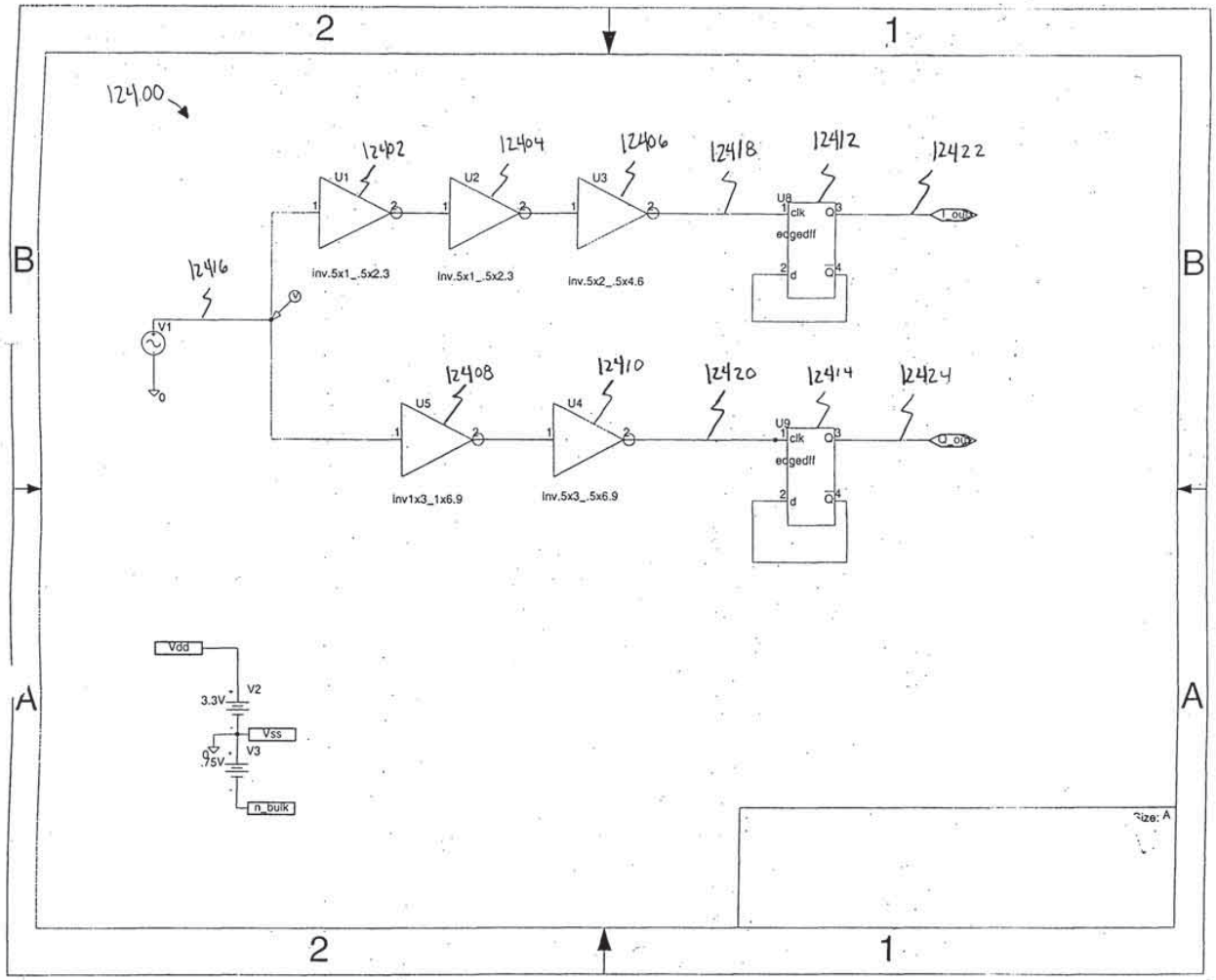


FIG 124A

1074

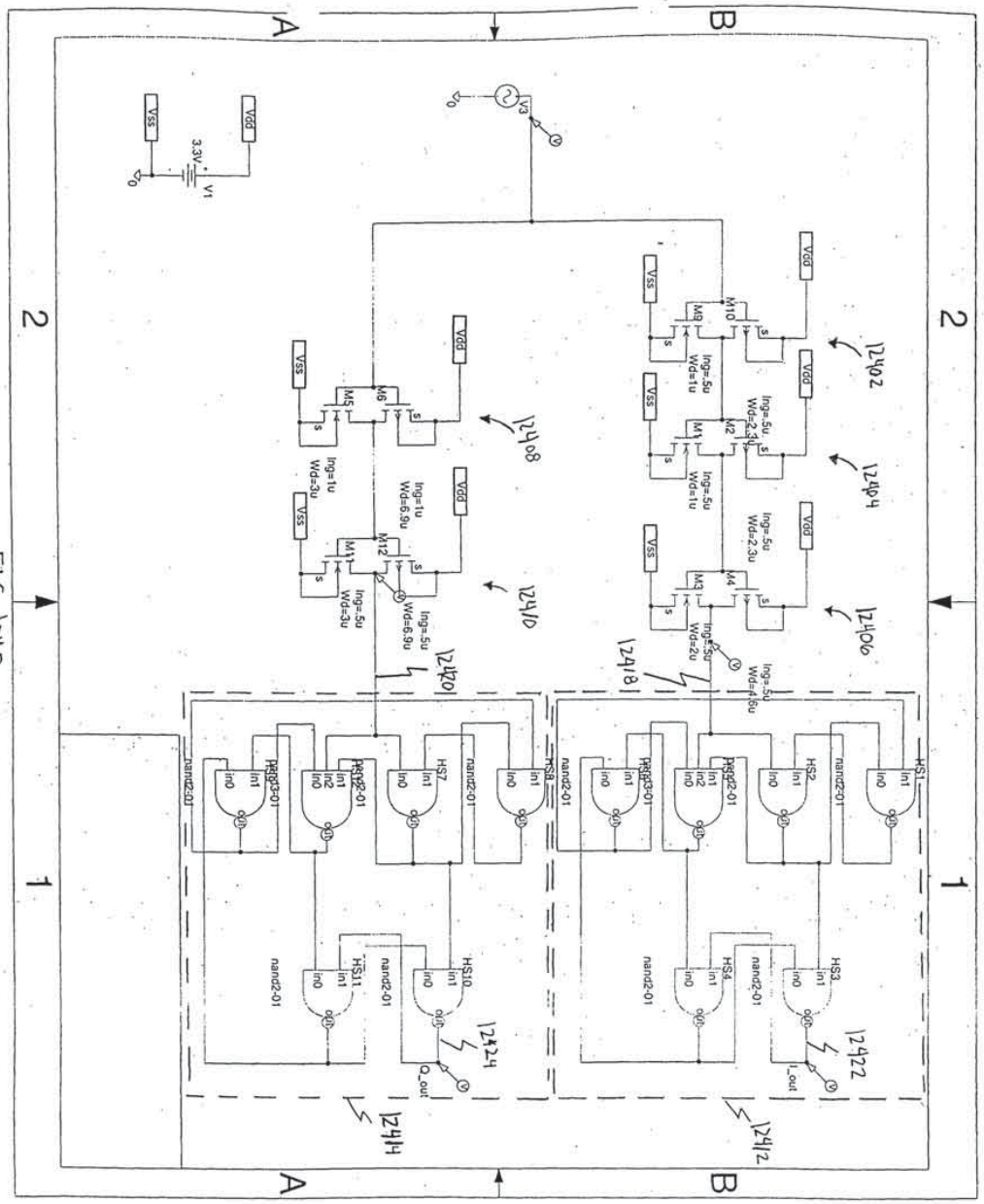

A
B
2
1
Vss
Vdd
3.3V
V1
V3
M10
M9
M1
M2
M8
M4
M5
M6
M11
M12
Ing=5u
Wd=1u
Wd=2.3u
Wd=2u
Wd=4.6u
Ing=1u
Wd=3u
Wd=6.9u
12402
12404
12406
12408
12410
12418
12420
HS1
HS2
HS3
HS4
HS7
HS8
HS10
HS11
nand2-01
nand3-01
I_out
Q_out
12422
12424
12412
12414

FIG. 12B

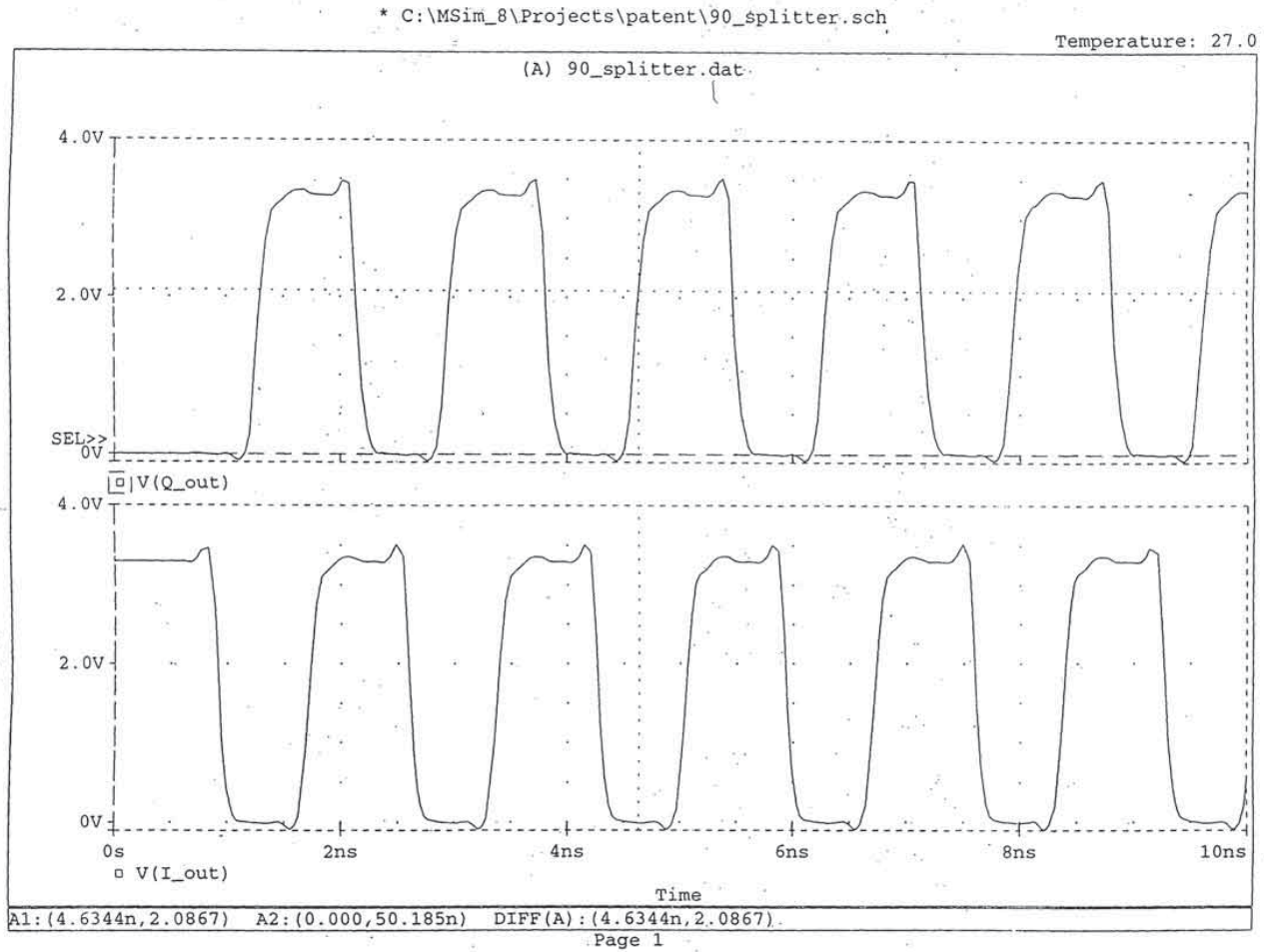


FIG. 12C

FIG. 12D

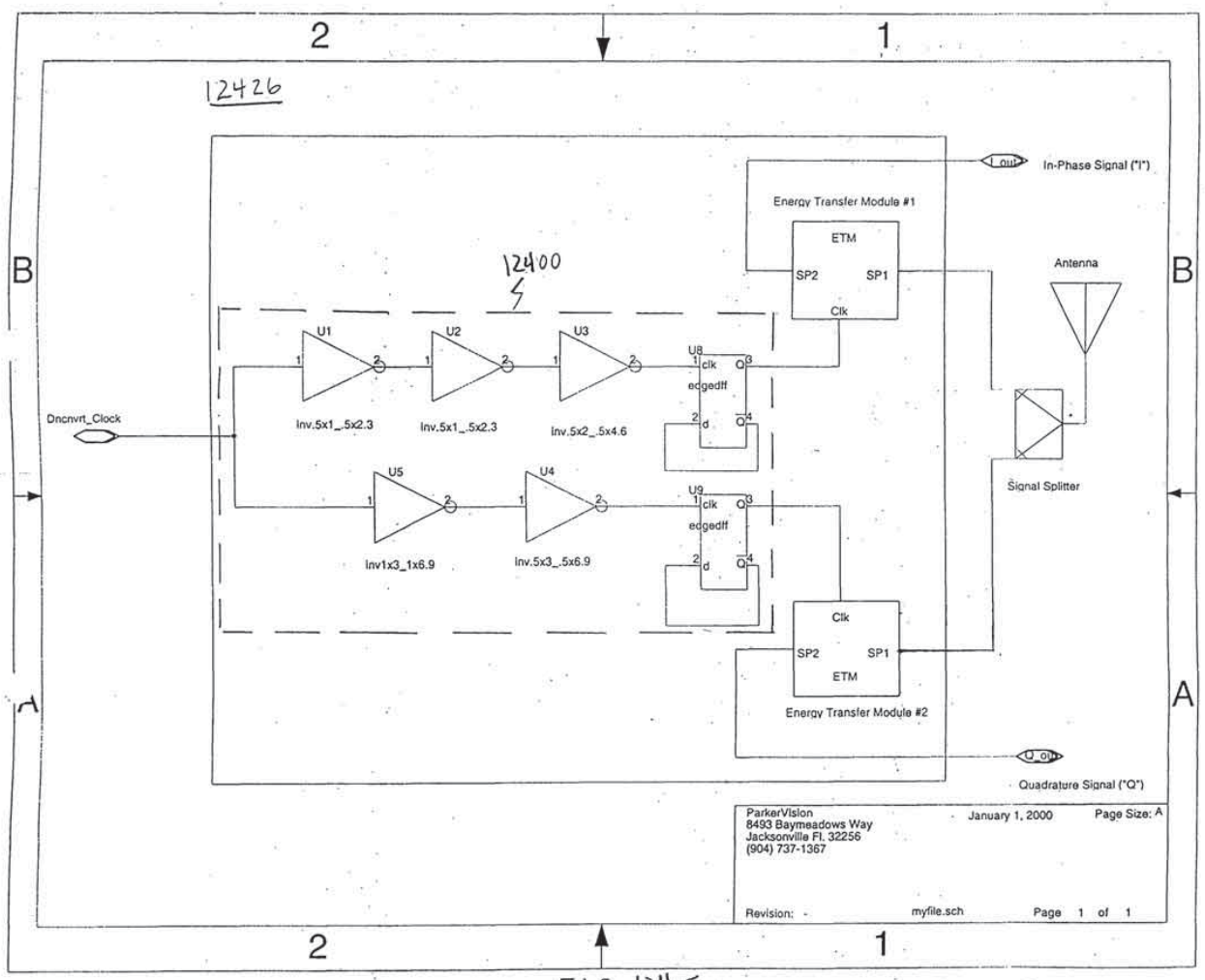
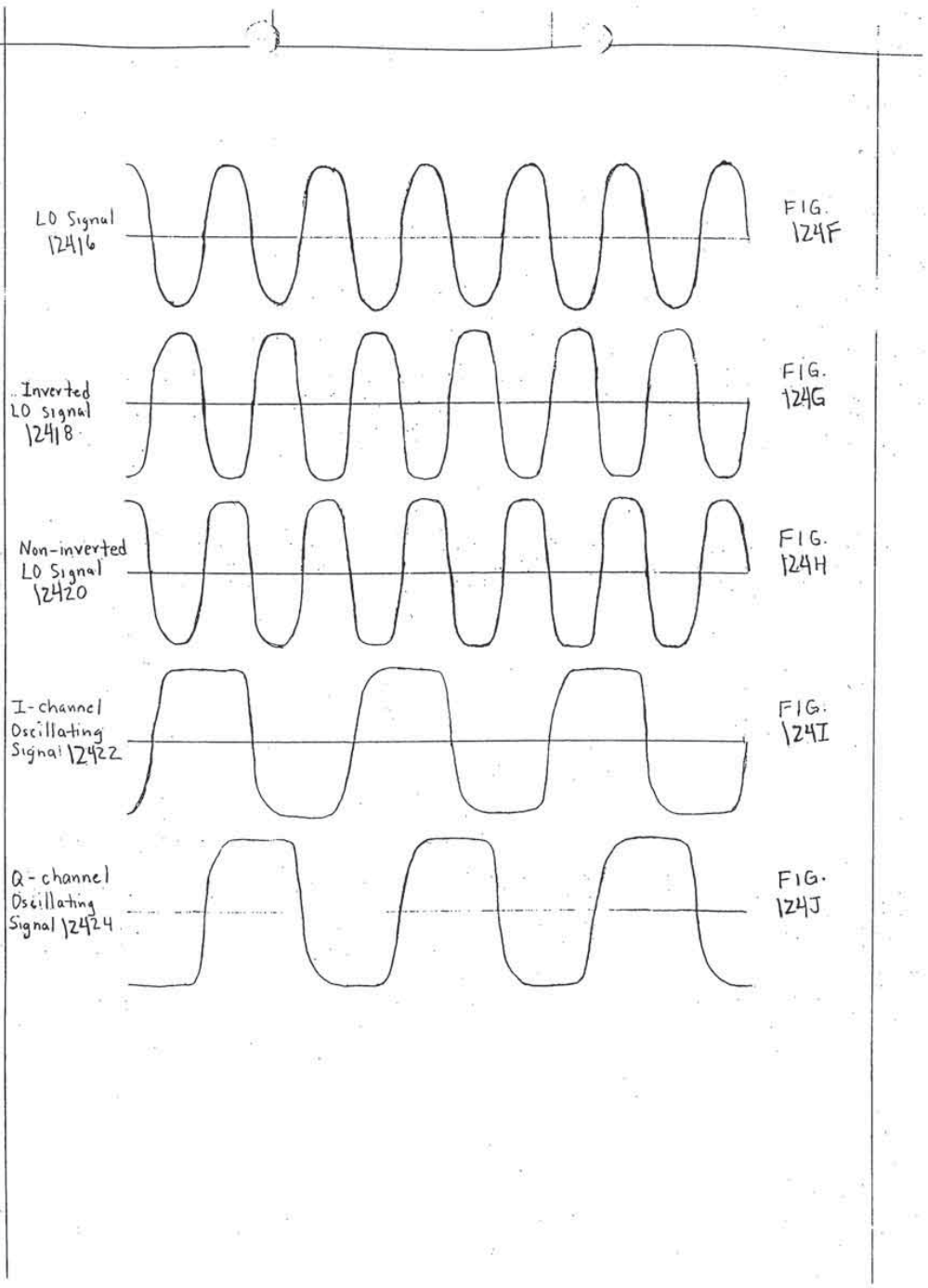


FIG. 12 4 E

09521979.030900



No. 5505 Engineer's Computation Pad

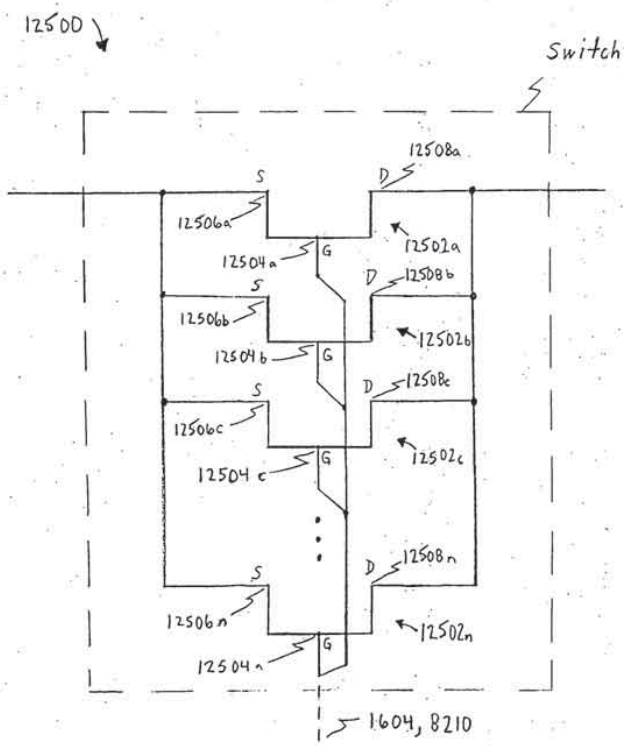

12500
Switch Module
12508a
S
D
12506a
12502a
12504a
G
D
12508b
S
12506b
12502b
12504b
G
D
12508c
S
12506c
12502c
12504c
G
12508n
D
S
12506n
12502n
G
12504n
1604, 8210

FIG. 125

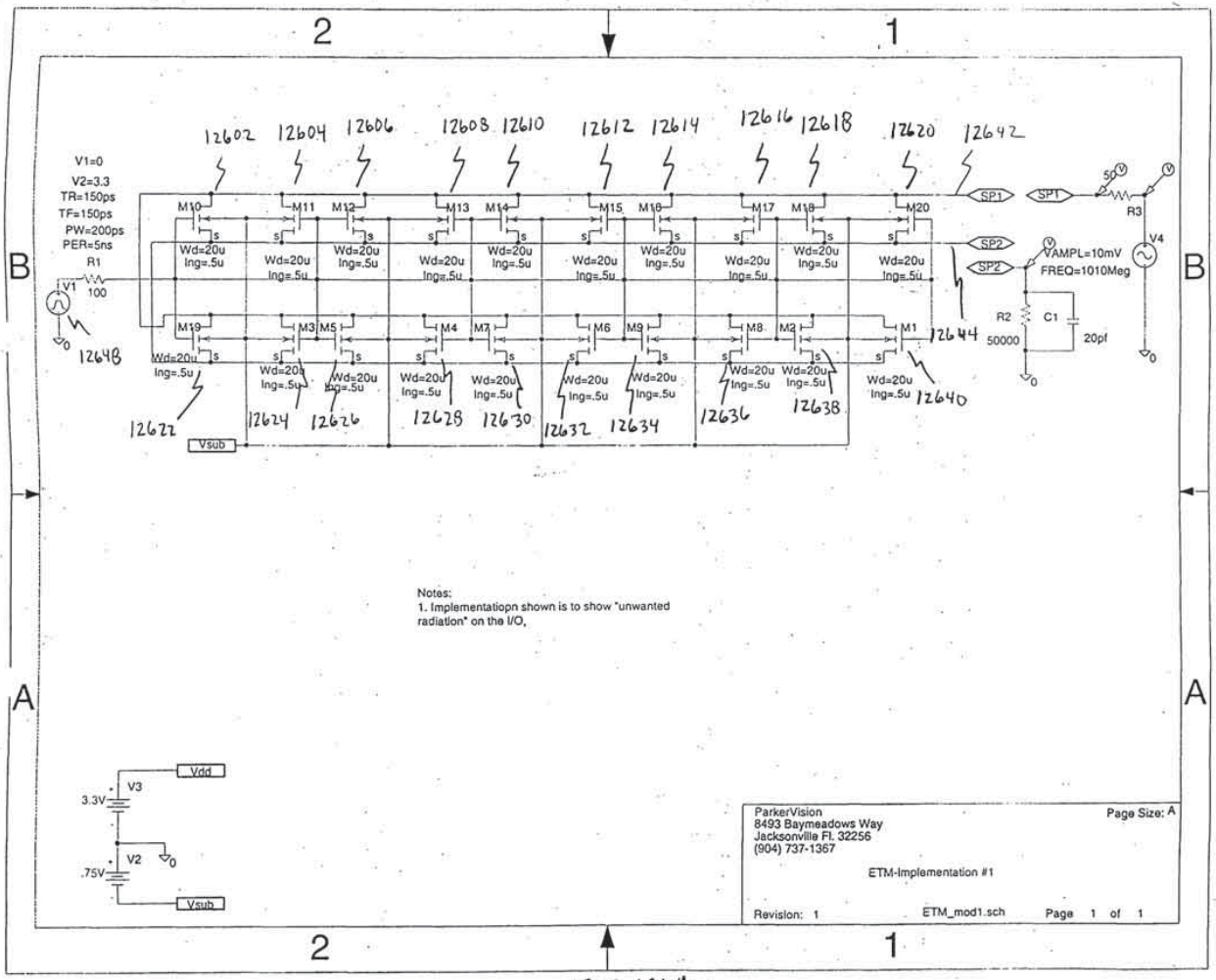


FIG.126A

09521879.030900

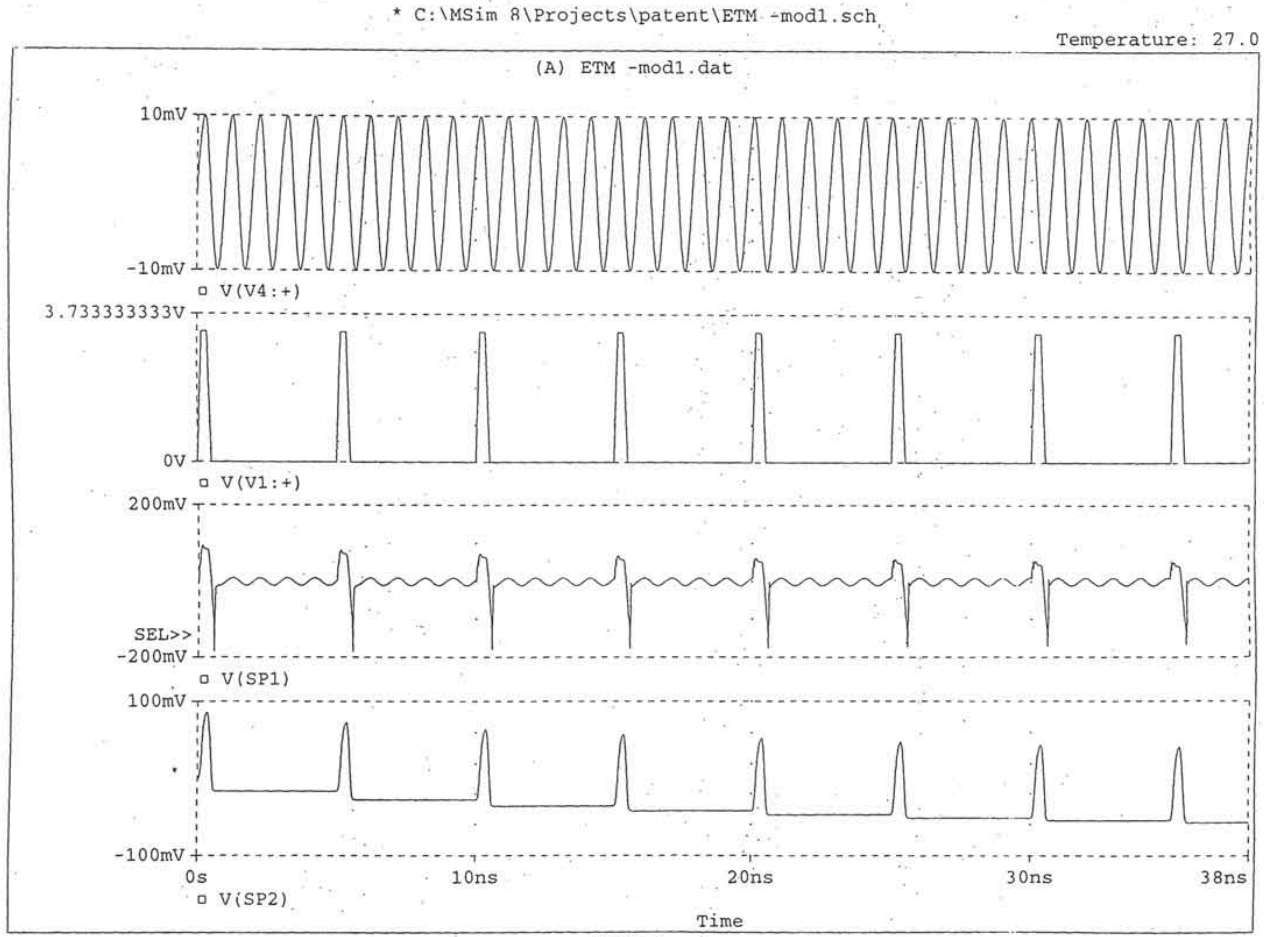


FIG 126B

FIG. 126C

FIG. 126D

FIG. 126E

09521879.030900

1081

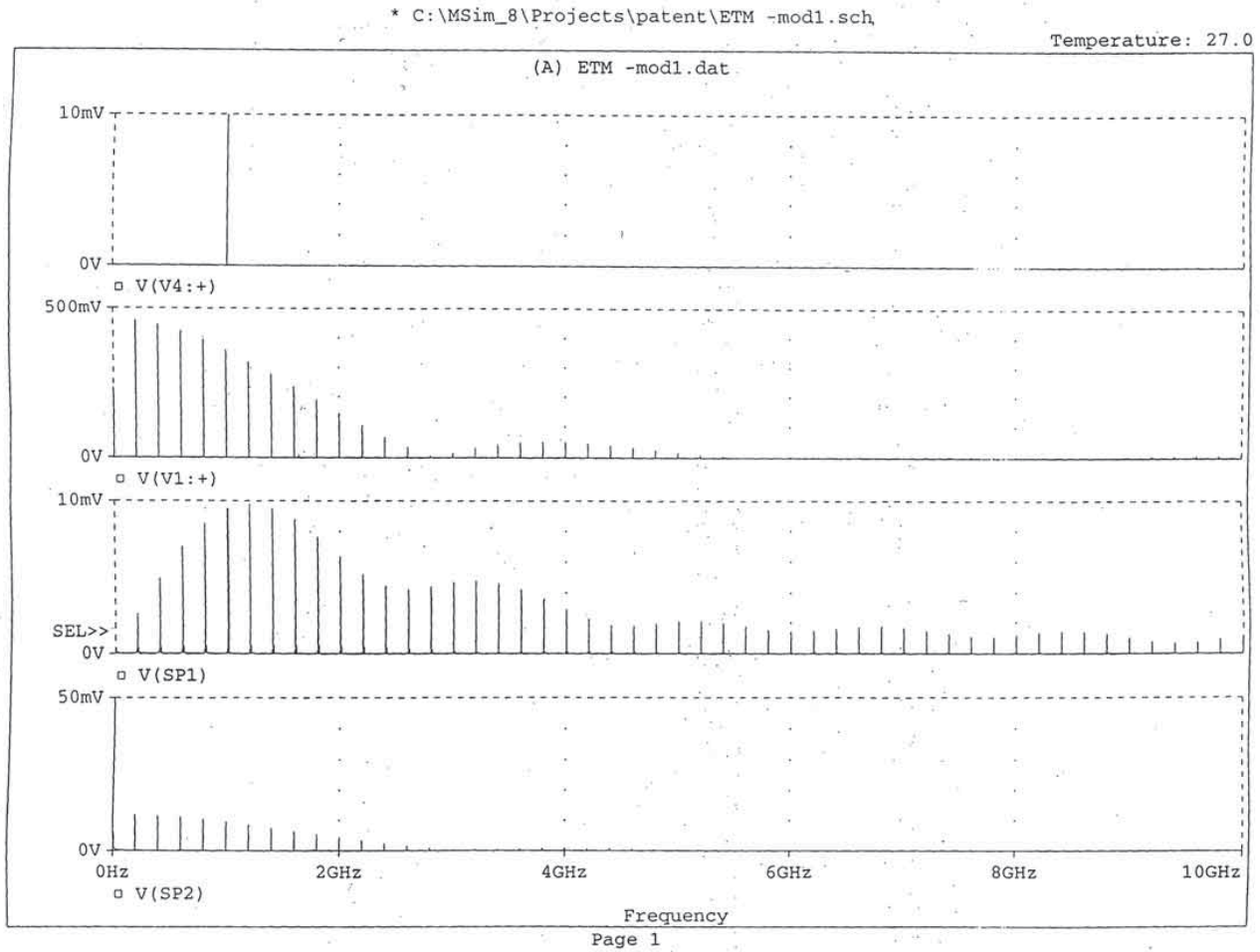


FIG 126 F

FIG. 126G

FIG. 126 H

FIG. 126 I

09521879.030900

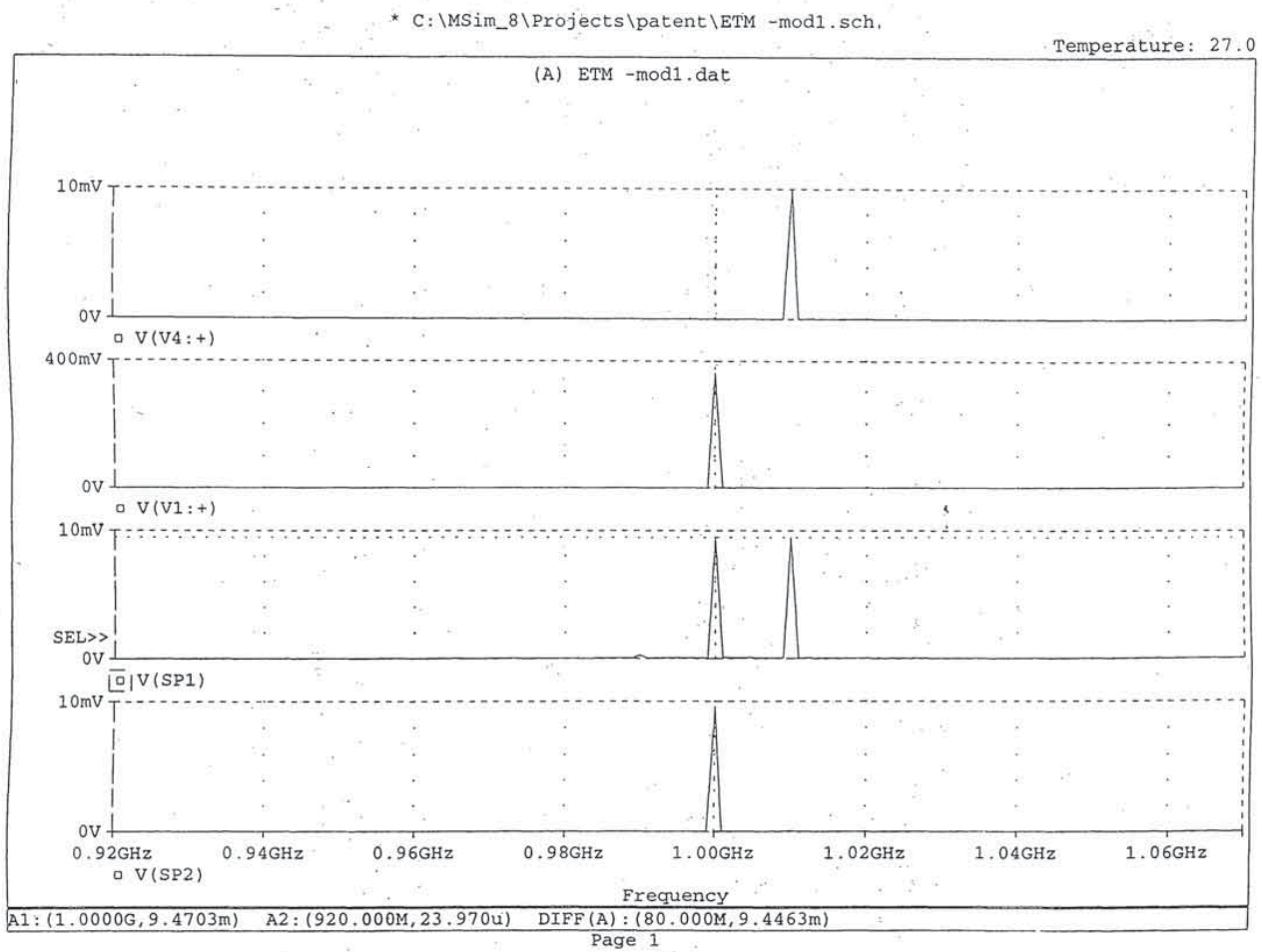


FIG. 126J

FIG. 126K

FIG 126L

FIG 126M

09521879.030900

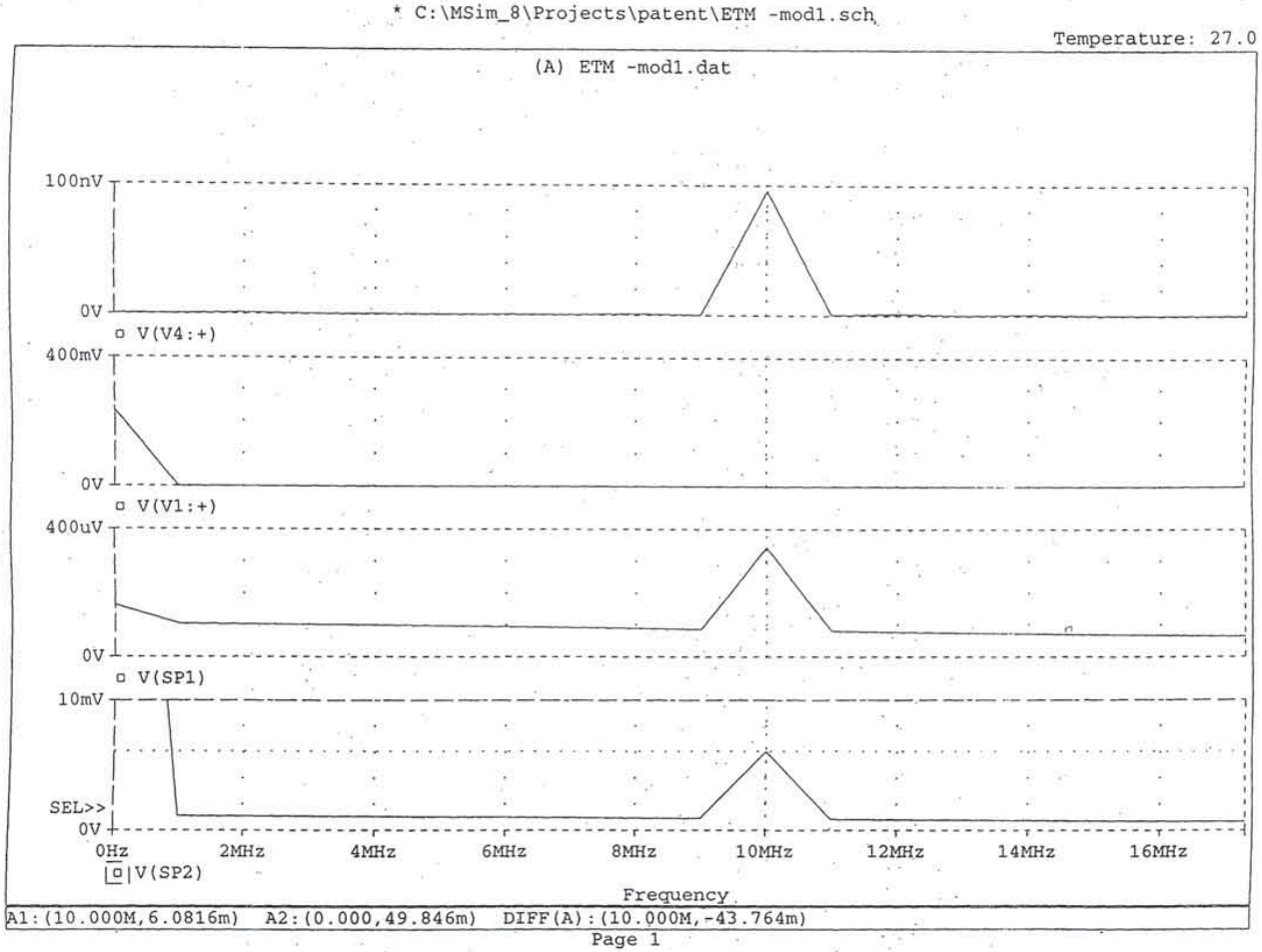


FIG 126N

FIG 126O

FIG 126P

FIG. 126Q

09521879.030900

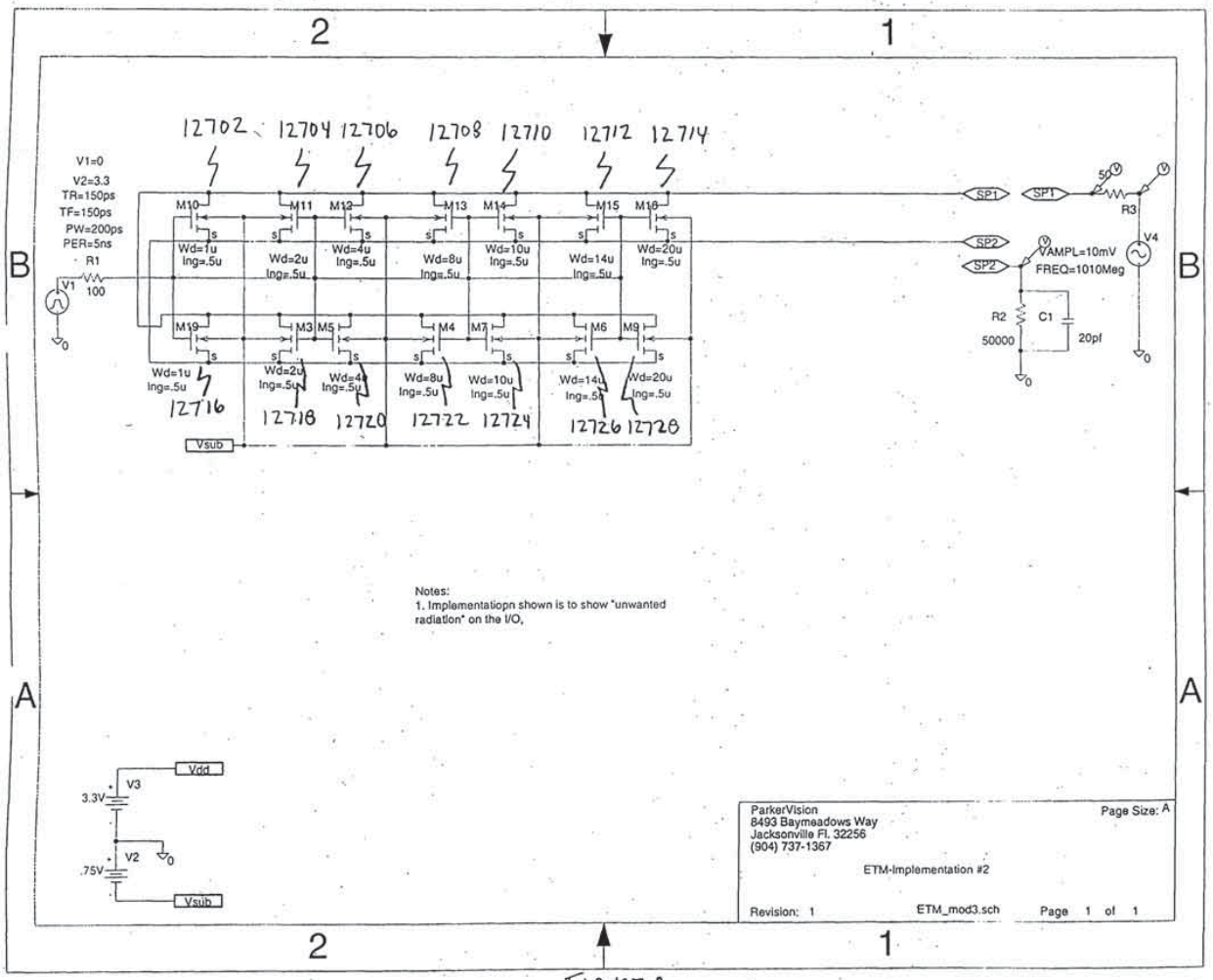

12702
12704
12706
12708
12710
12712
12714
V1=0
V2=3.3
TR=150ps
TF=150ps
PW=200ps
PER=5ns
R1
100
V1
M10
M11
M12
M13
M14
M15
M16
M19
M3
M5
M4
M7
M6
M9
Wd=1u
Wd=2u
Wd=4u
Wd=8u
Wd=10u
Wd=14u
Wd=20u
lng=.5u
12716
12718
12720
12722
12724
12726
12728
Vsub
SP1
SP2
R3
50
V4
VAMPL=10mV
FREQ=1010Meg
R2
50000
C1
20pf
Notes:
1. Implementatiopn shown is to show "unwanted radiation" on the I/O,
Vdd
V3
3.3V
V2
.75V
ParkerVision
8493 Baymeadows Way
Jacksonville Fl. 32256
(904) 737-1367
Page Size: A
ETM-Implementation #2
Revision: 1
ETM_mod3.sch
Page 1 of 1

FIG.127A

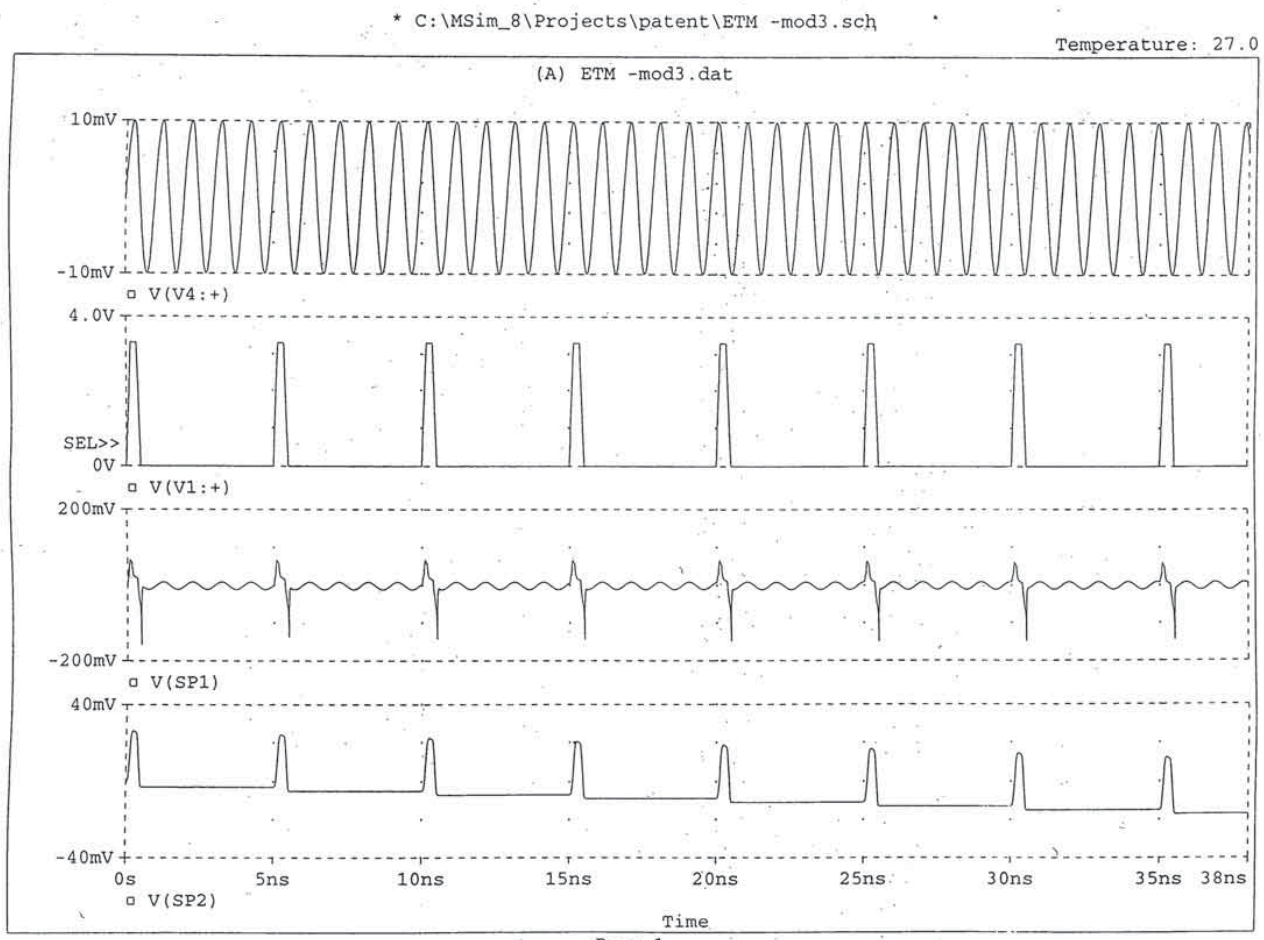


FIG. 127B

FIG. 127C

FIG. 127D

FIG. 127E

09521879.030900

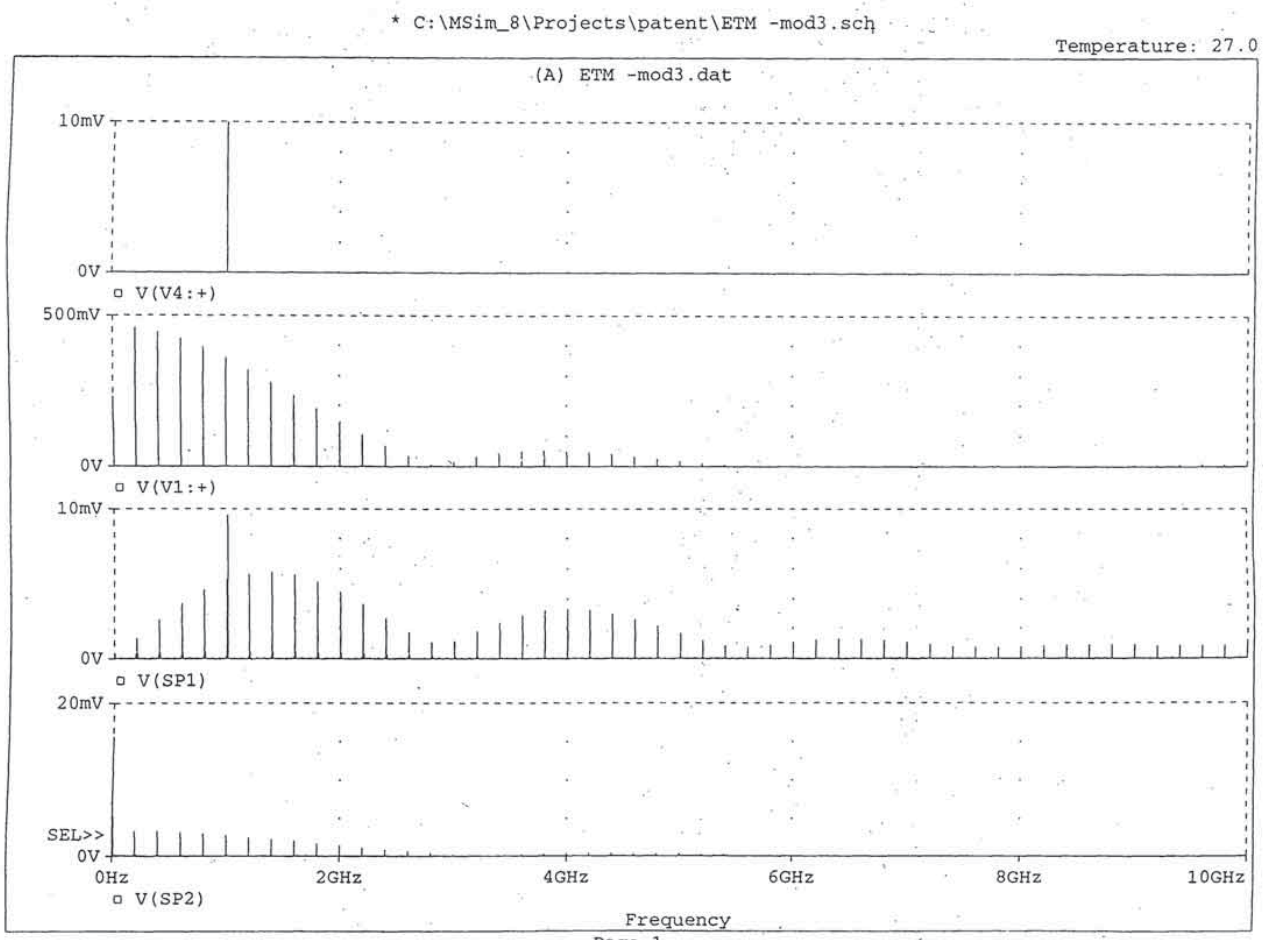


FIG. 127F

FIG. 127G

FIG. 127H

FIG 127I

09521879.030900

1087

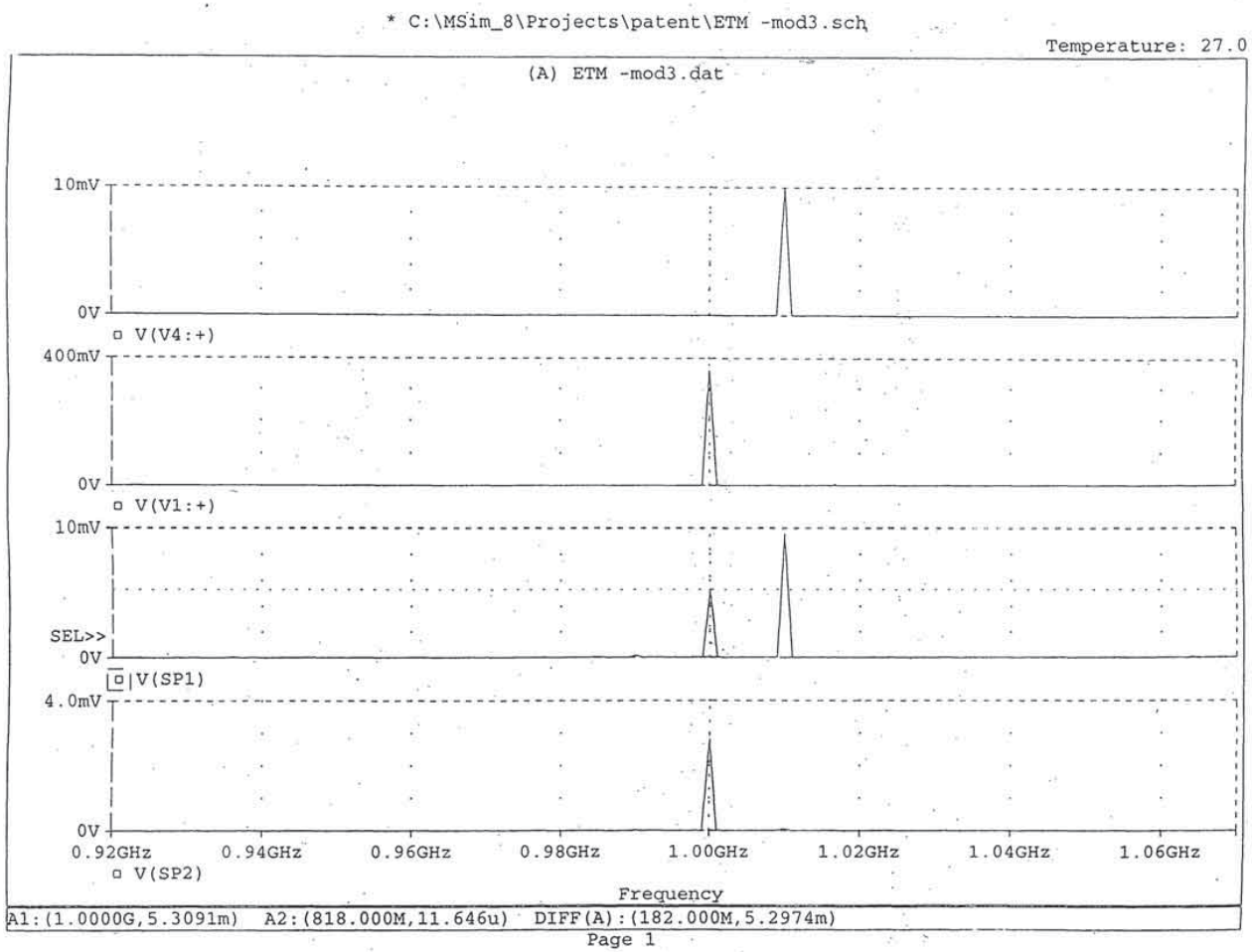


FIG 127J

FIG. 127K

FIG 127L

FIG. 127M

09521879.030900

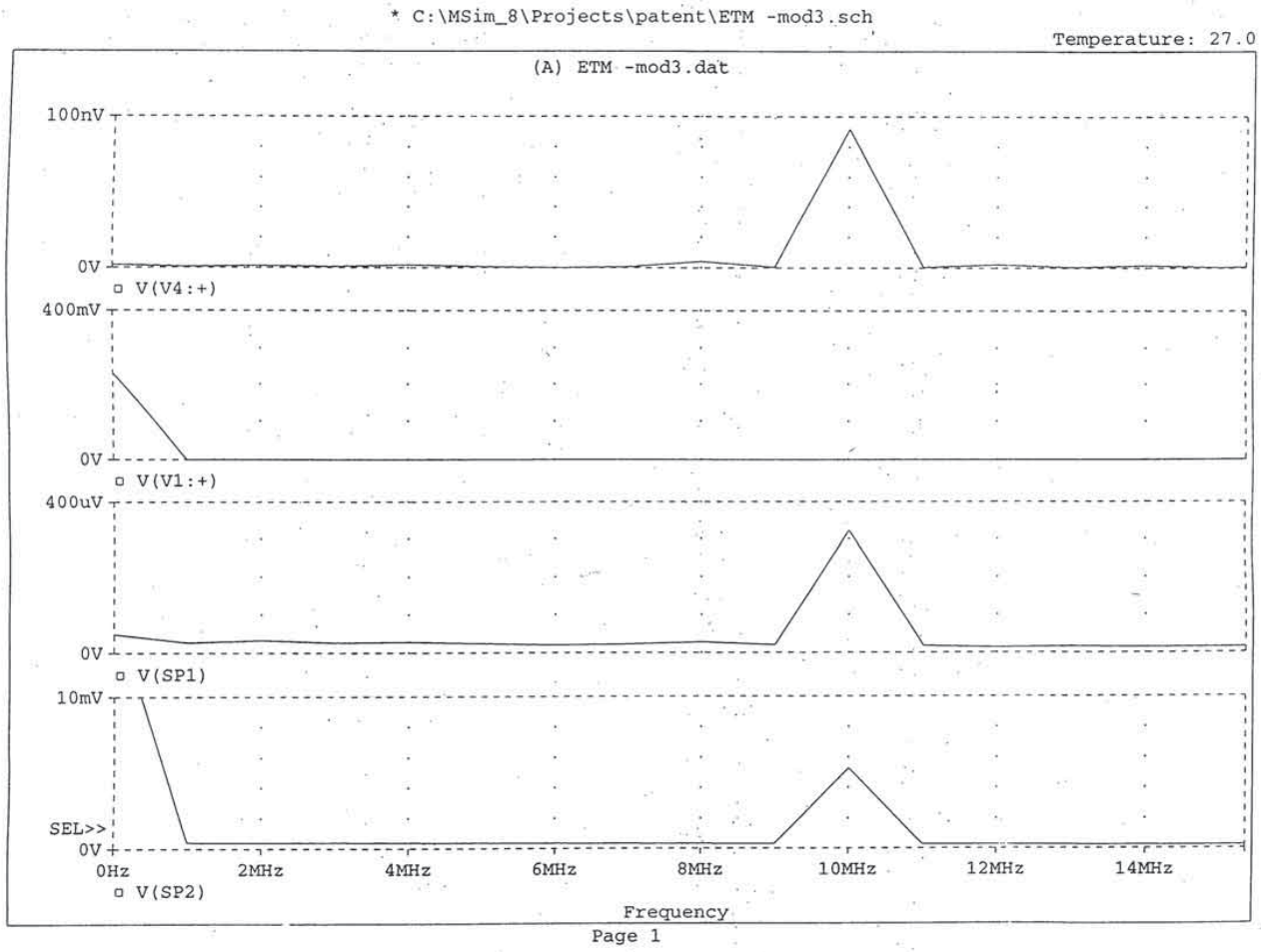


FIG 127N

FIG 127O

FIG 127P

FIG 127Q

09521979.030900

No. 5505
Engineer's Computation Pad

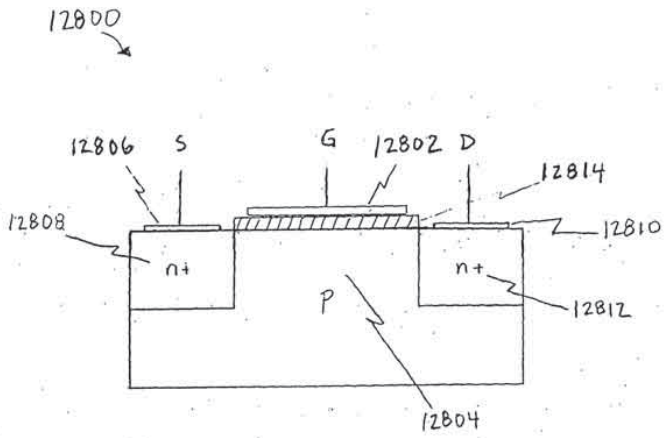


FIG. 128A

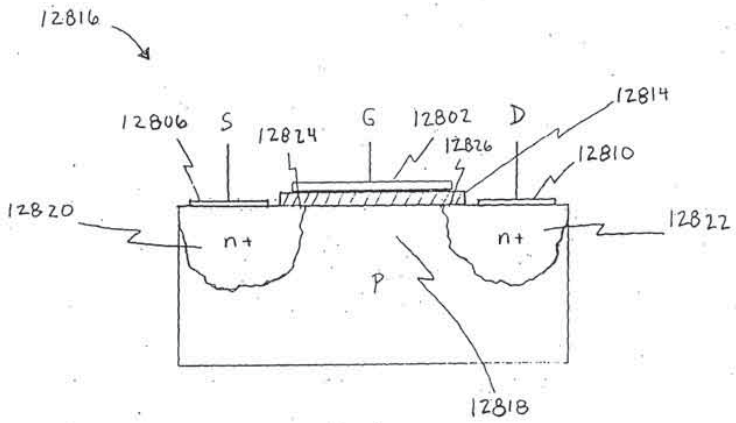


FIG. 128B

No. 5505
Engineer's Computation Pad

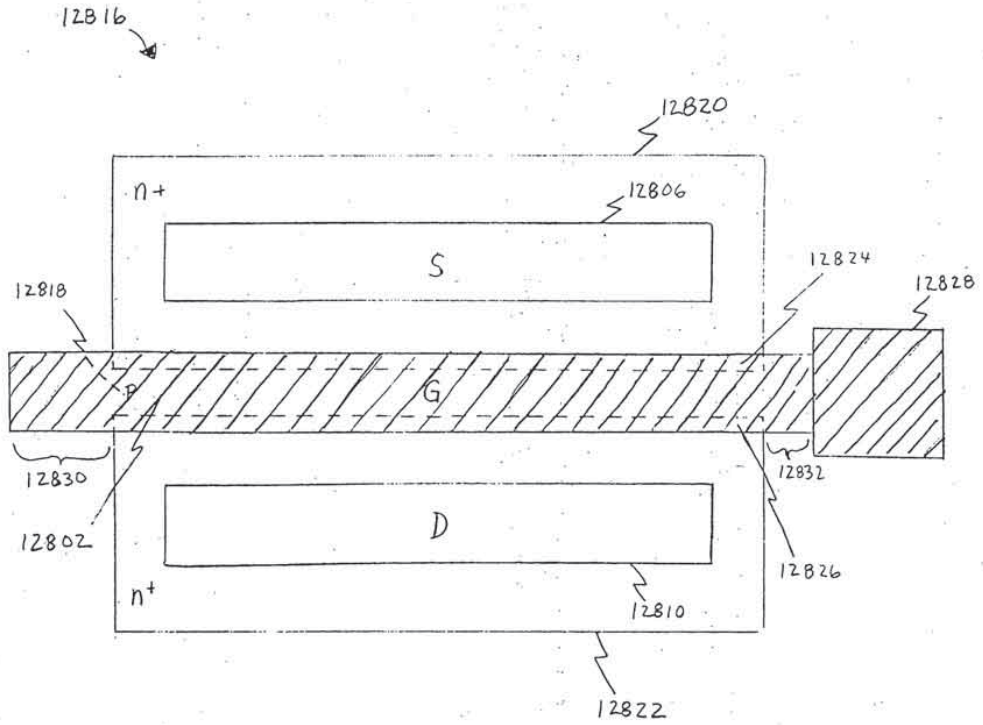


FIG. 128C

09521879.030900

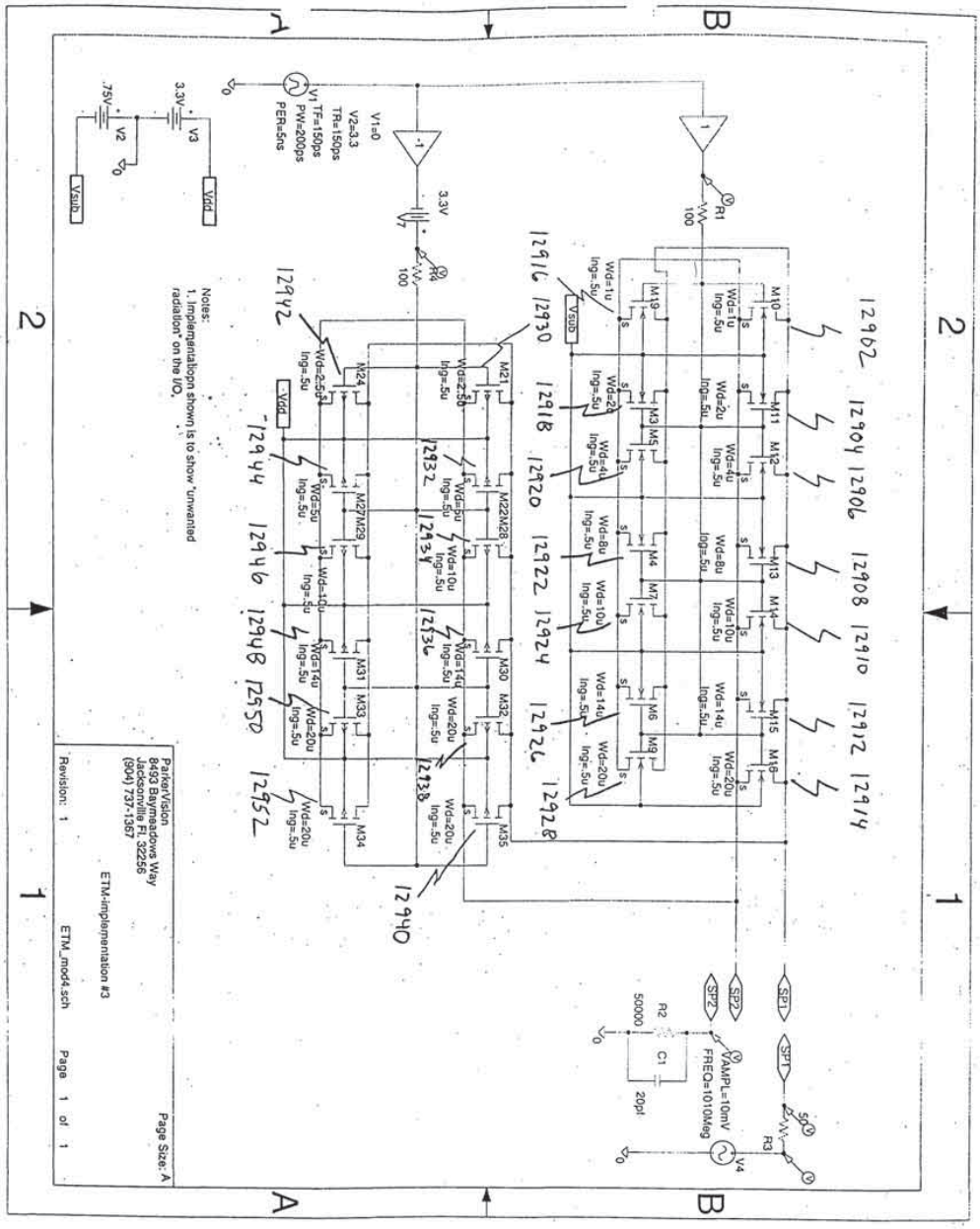


FIG. 129A

US 9,768,978 B2

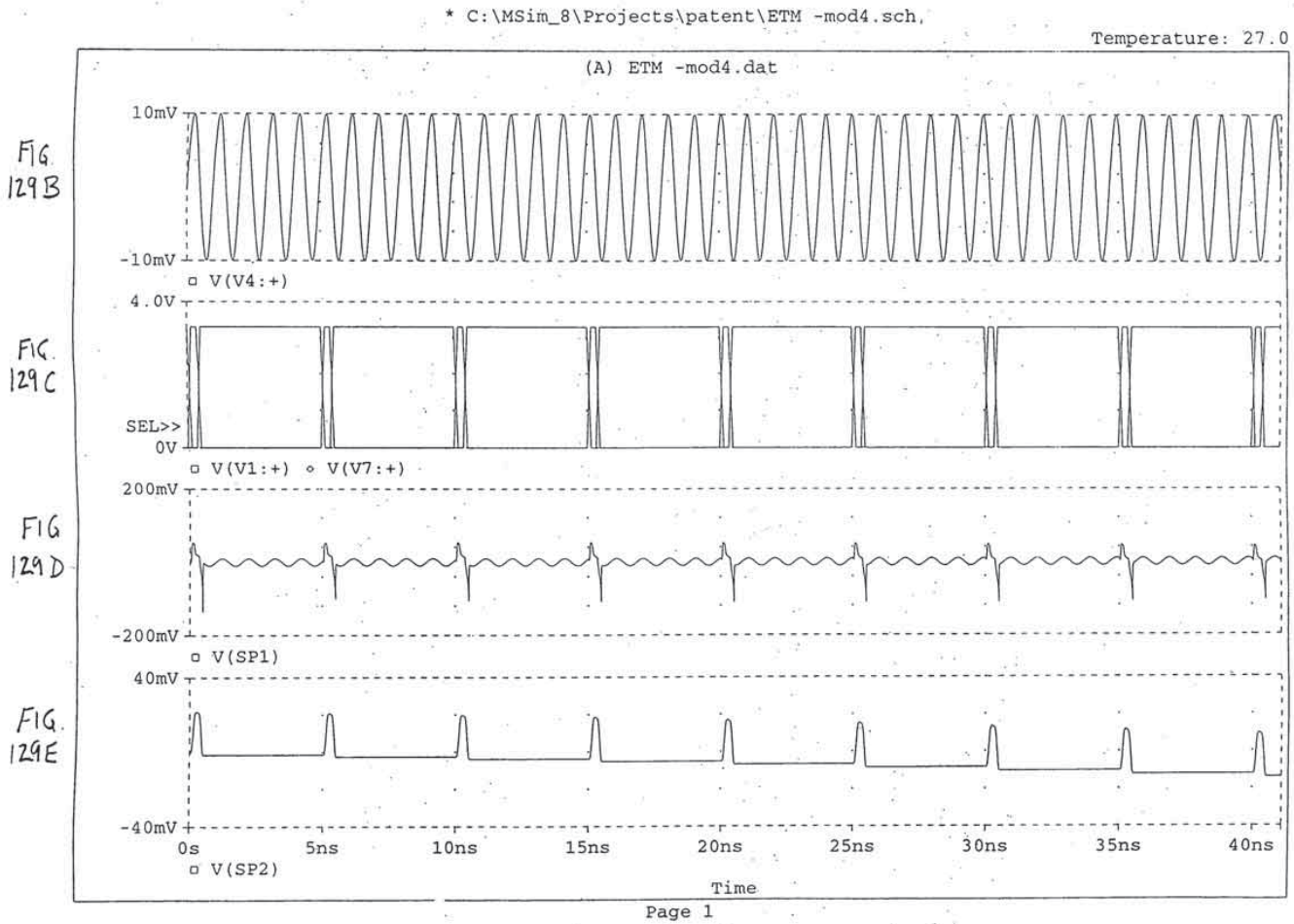


FIG. 129B

FIG. 129C

FIG 129D

FIG. 129E

09521979.030900

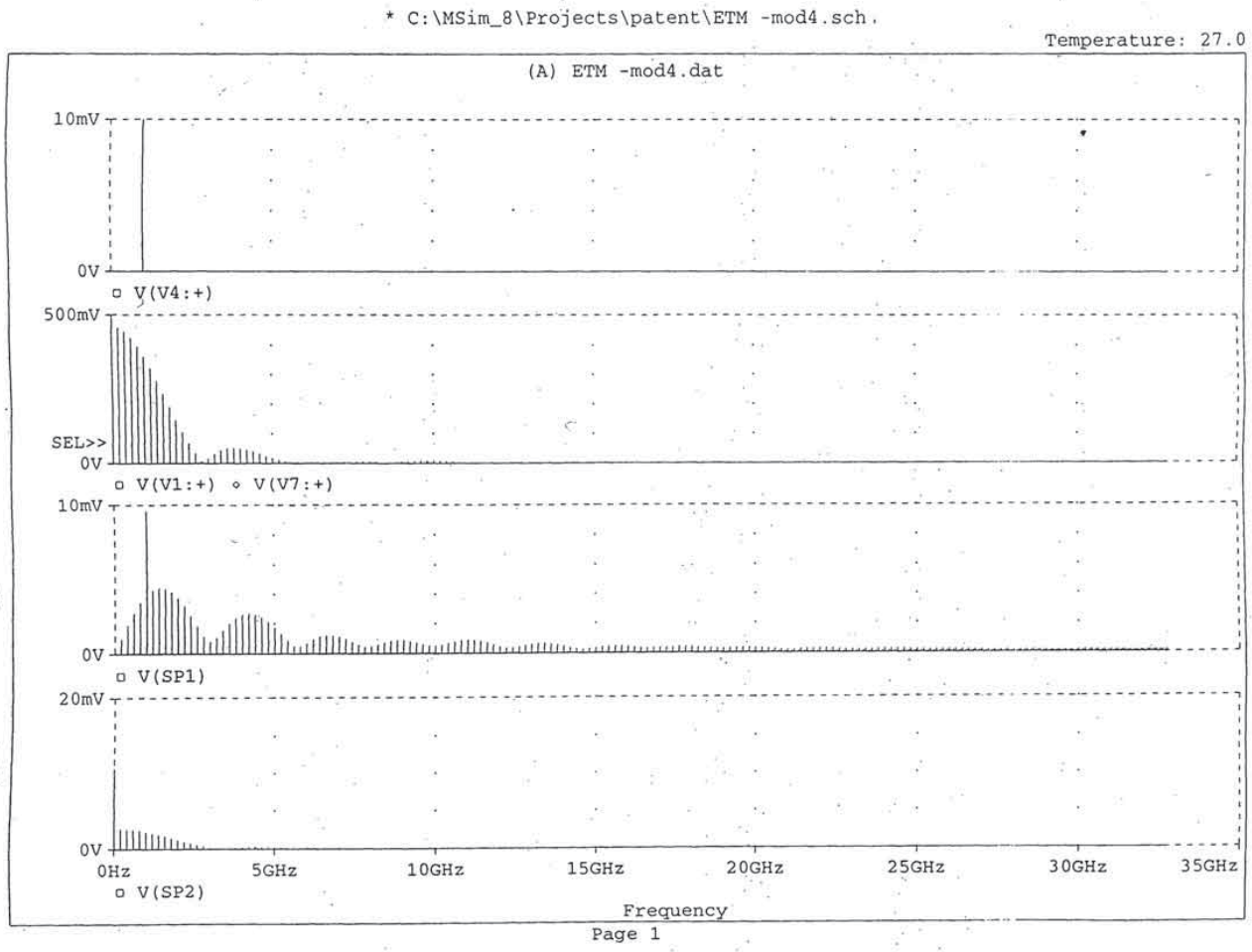


FIG 129F

FIG 129G

FIG 129H

FIG 129I

09521879.030900

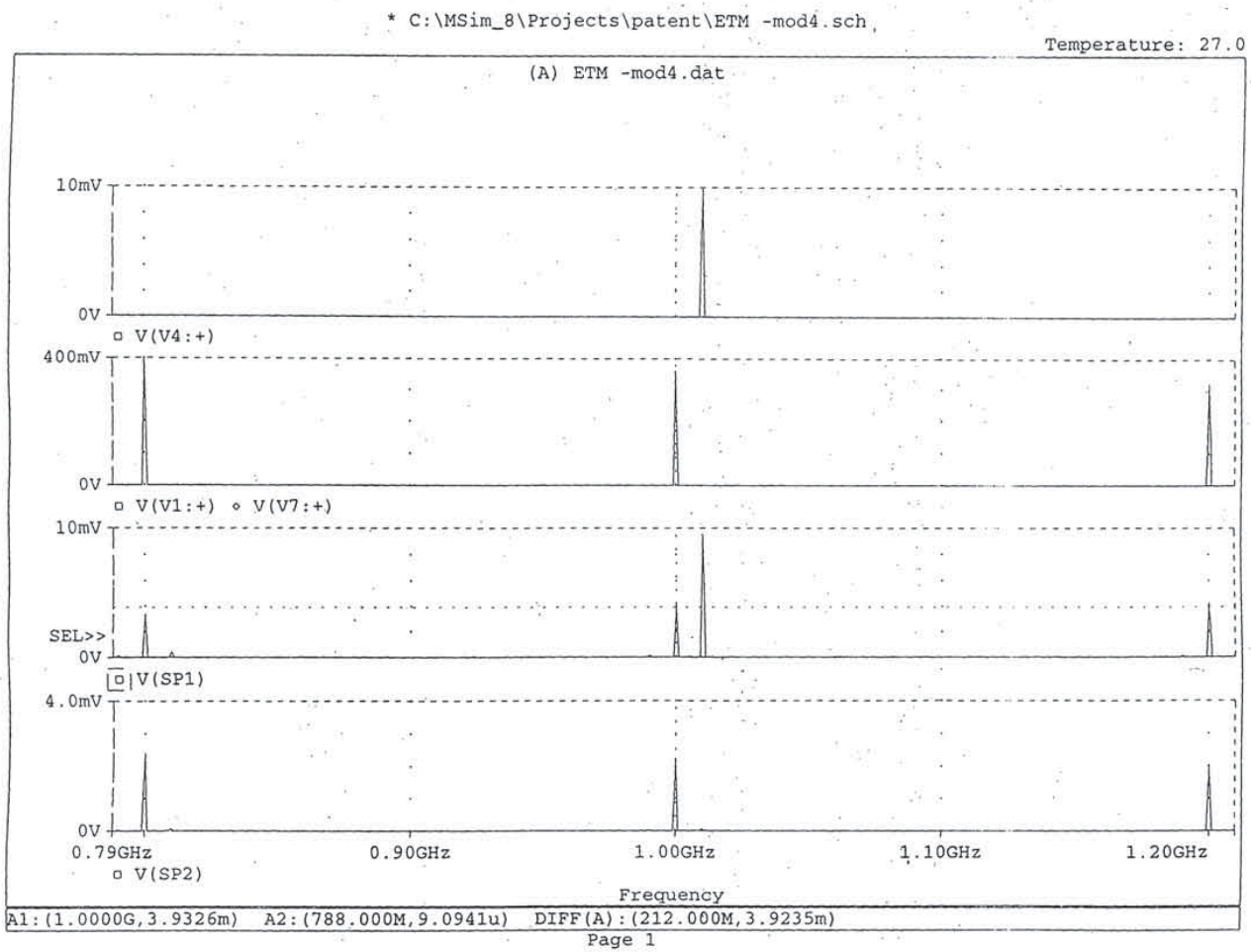


FIG 129J

FIG 129K

FIG 129L

FIG 129M

09521879.030900

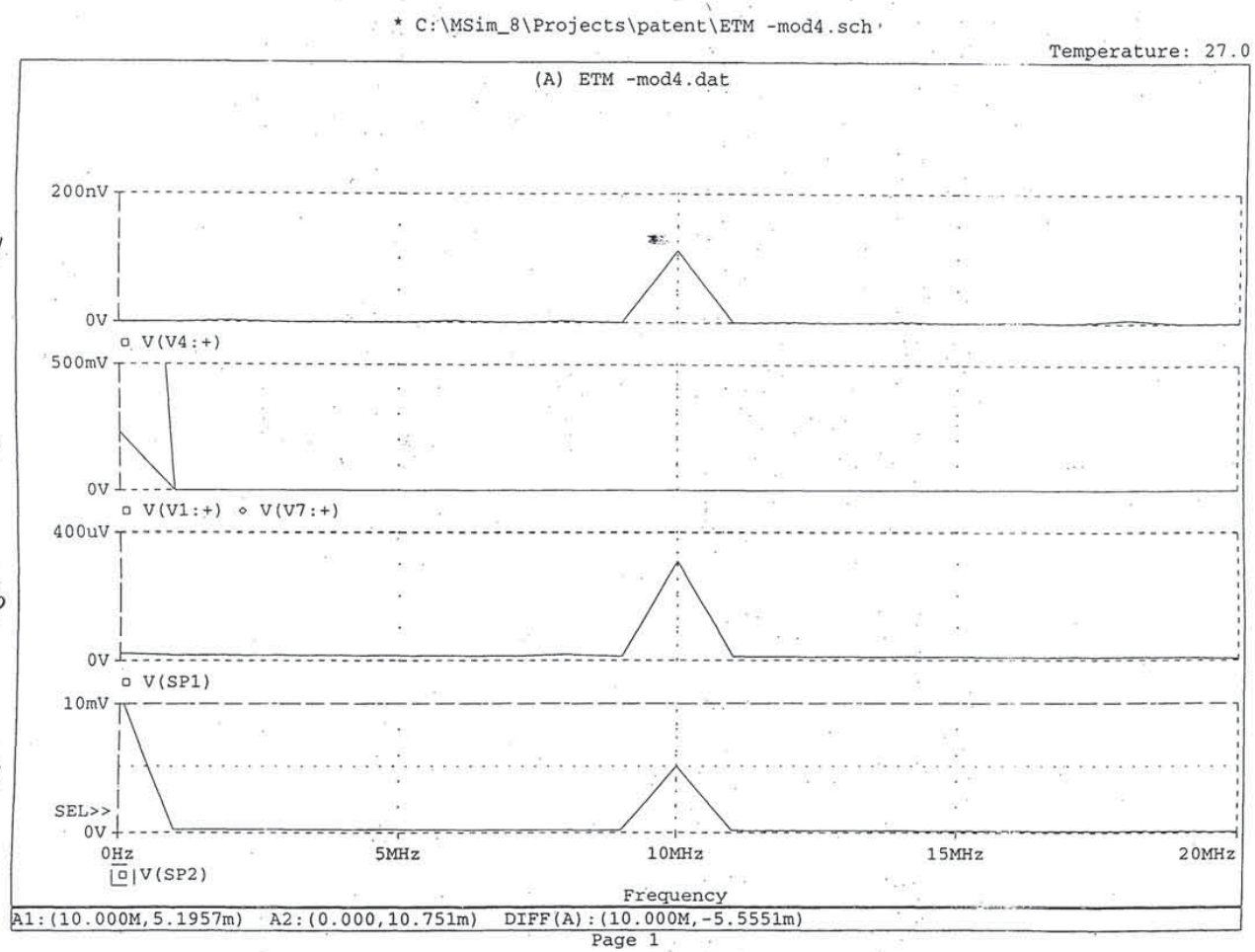


FIG 129N

FIG 129O

FIG 129P

FIG 129Q

09521879.030900

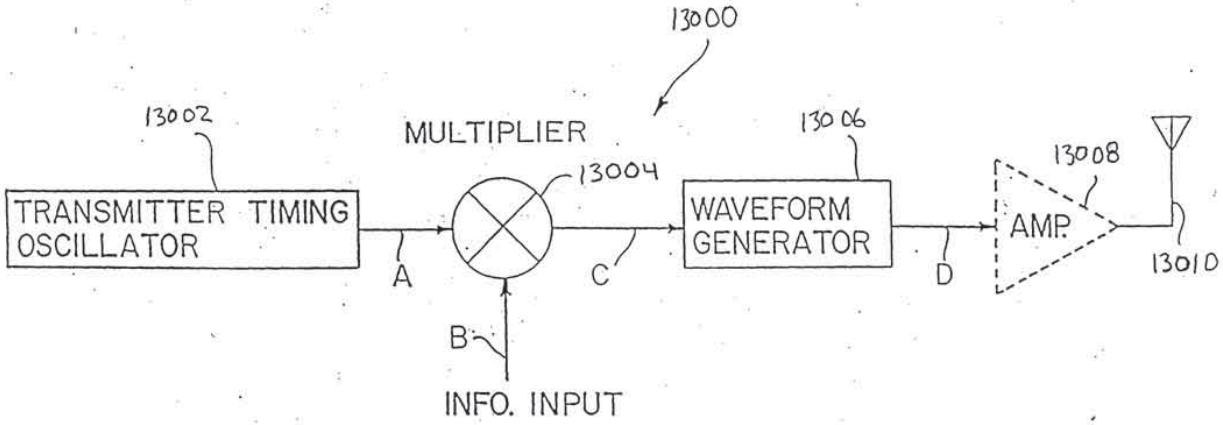


FIG. 130

09521879.030900

1097

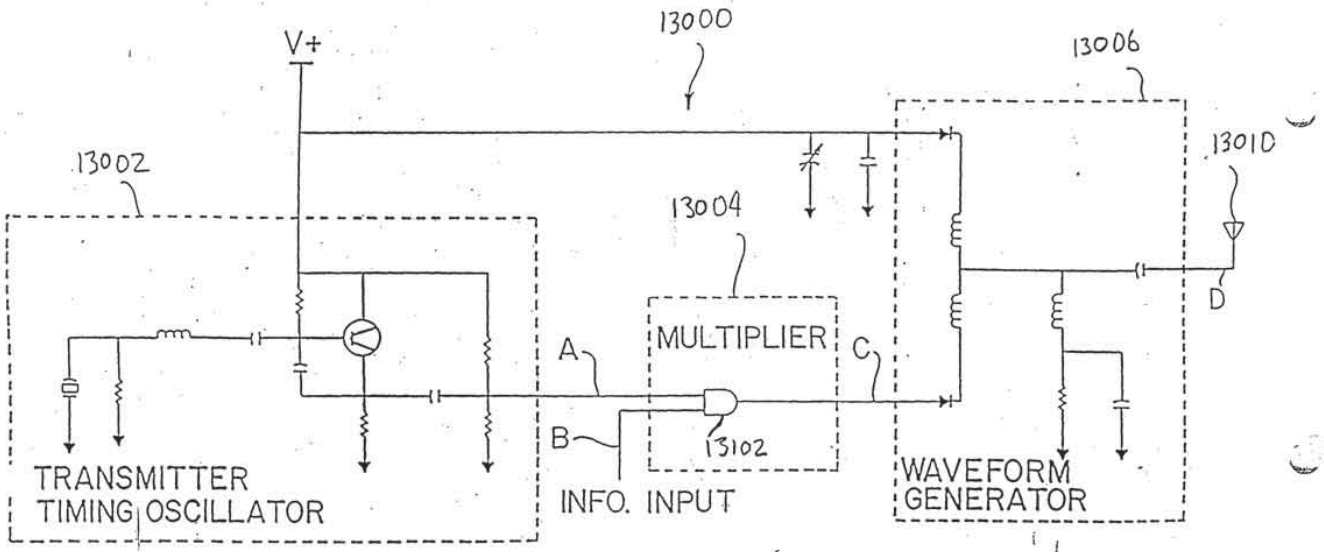


FIG. 131

09521879.030900

1098

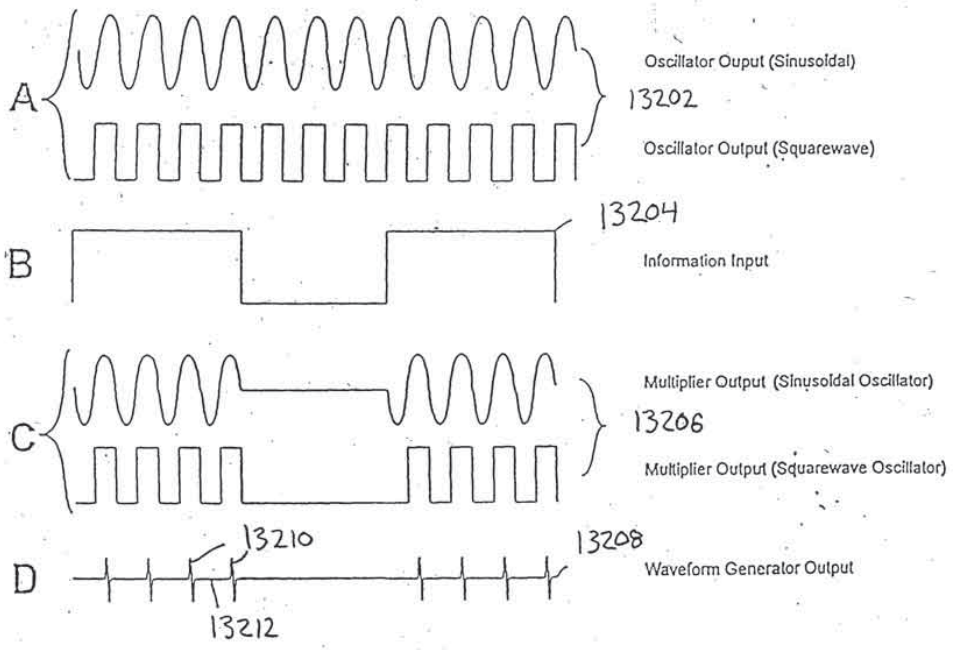


FIG. 132

09521879.030900

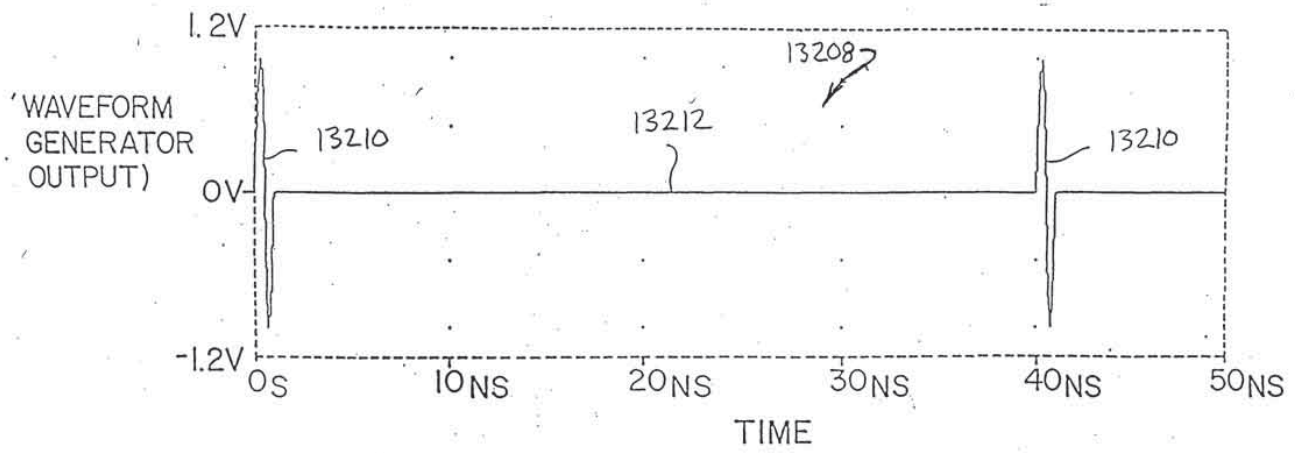


FIG. 133

09521879.030900

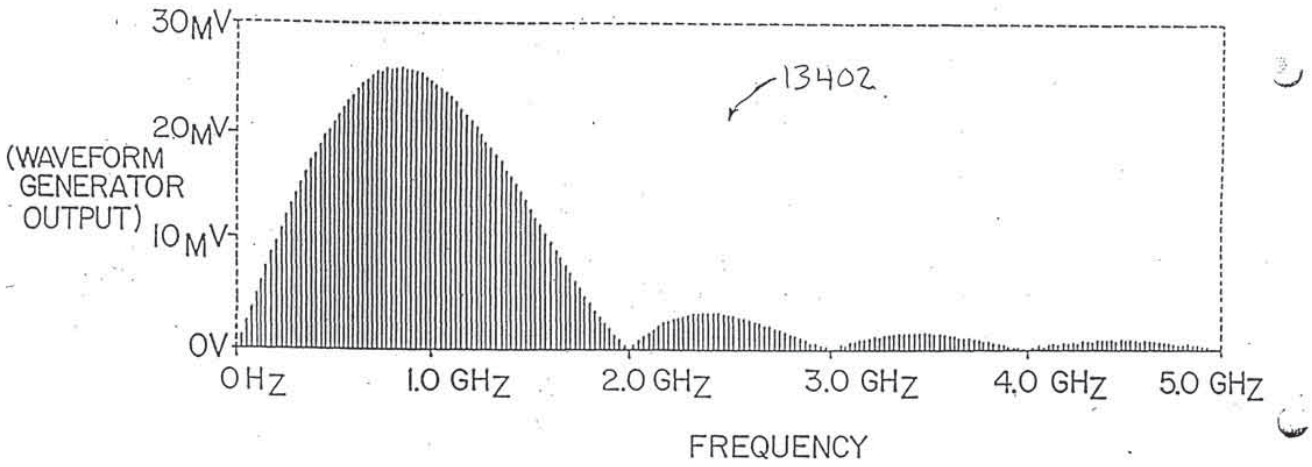


FIG. 134

D9521879.030900

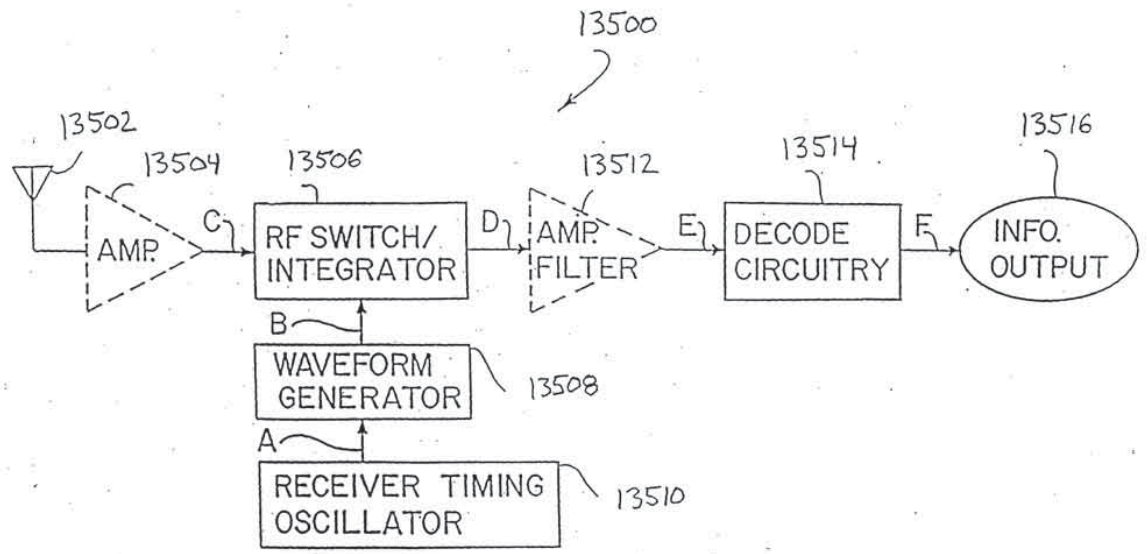


FIG. 135

09521879.030900

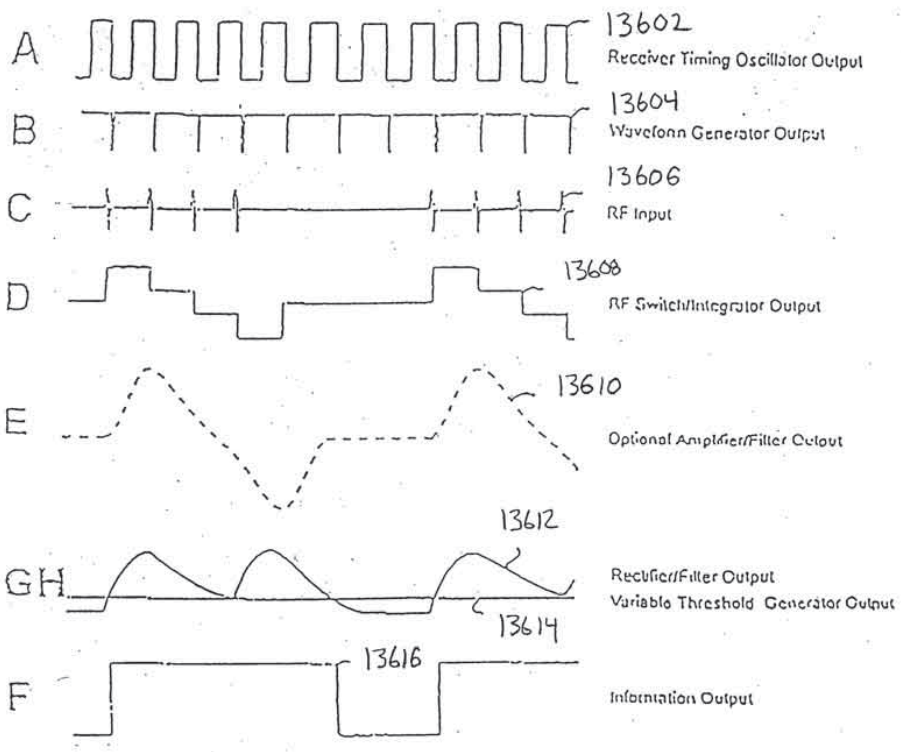


FIG. 136

09521879.030900

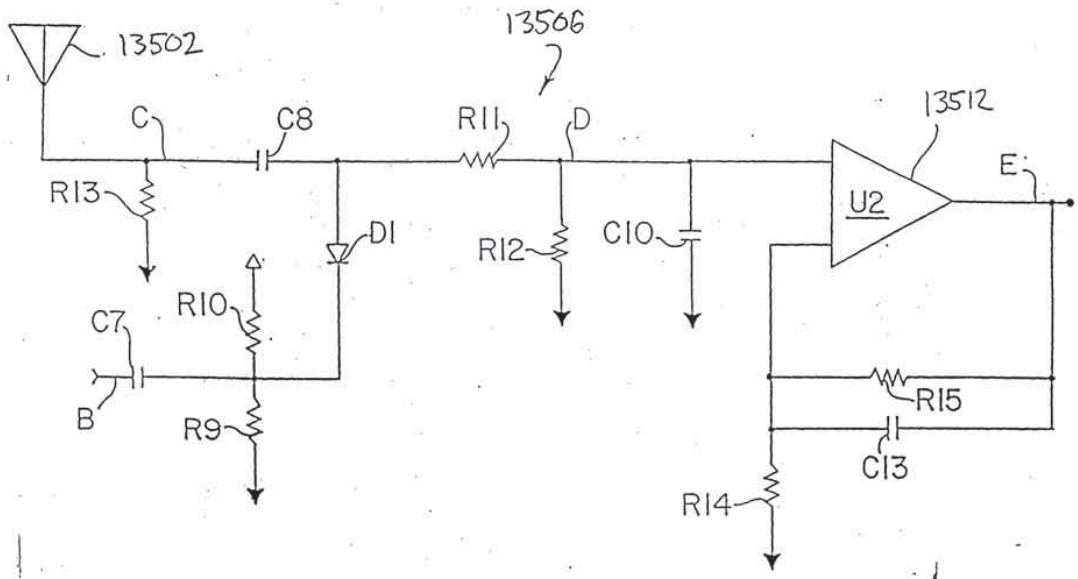


FIG. 137

09521879.030900

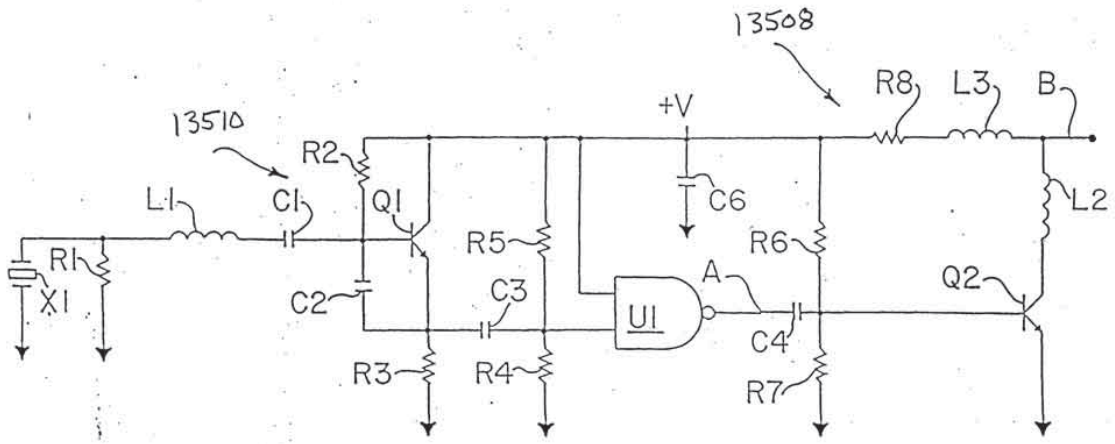


FIG. 138

09521879:030900

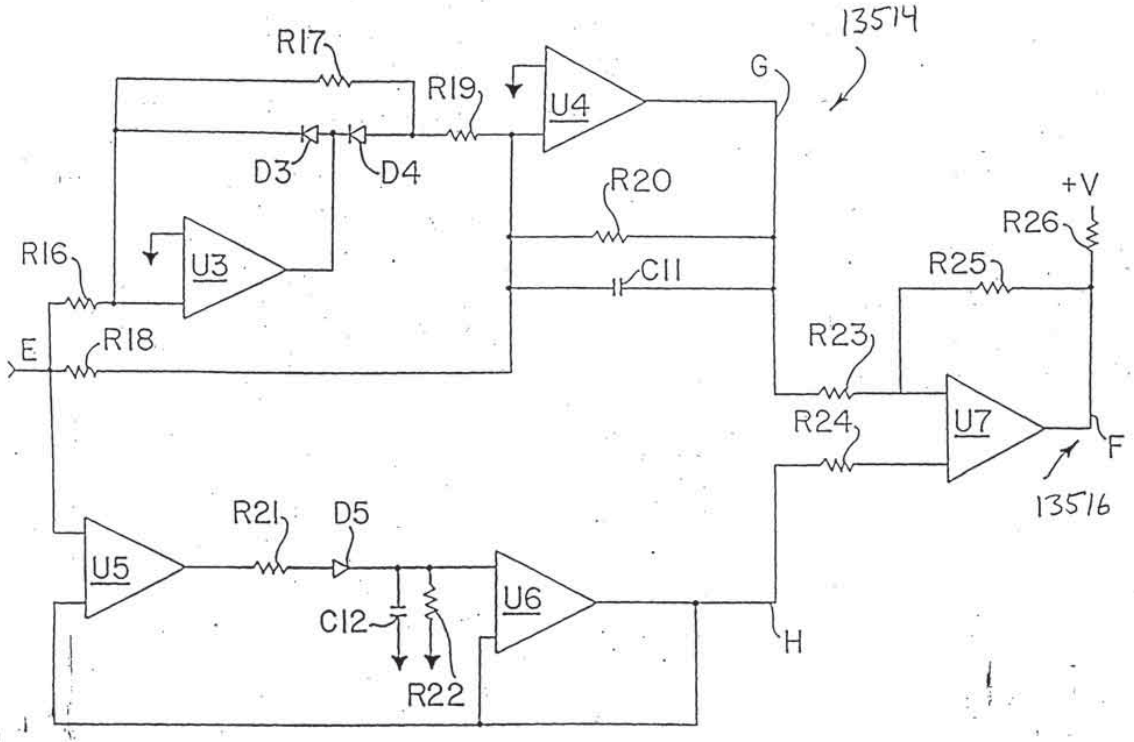


FIG. 139

09521879.030900

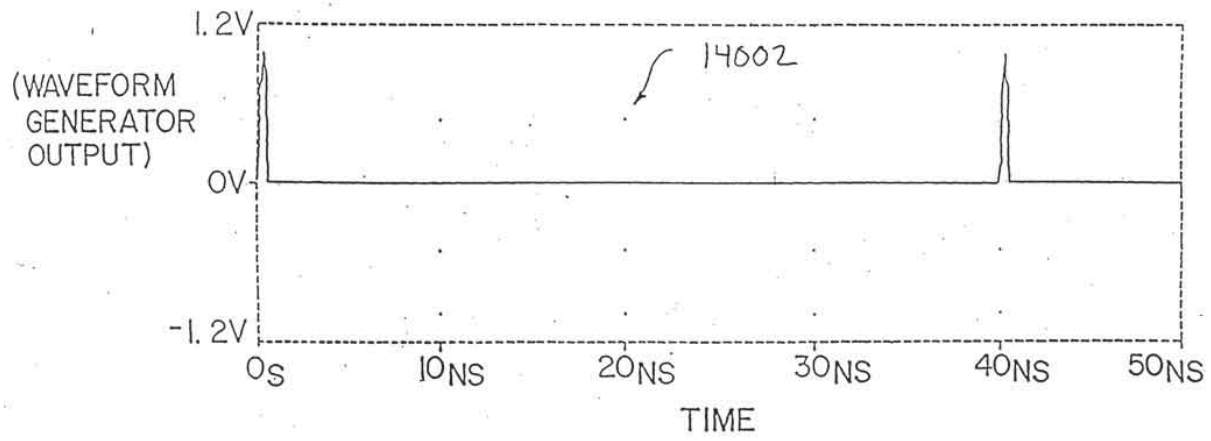


FIG. 140

09521879.030900

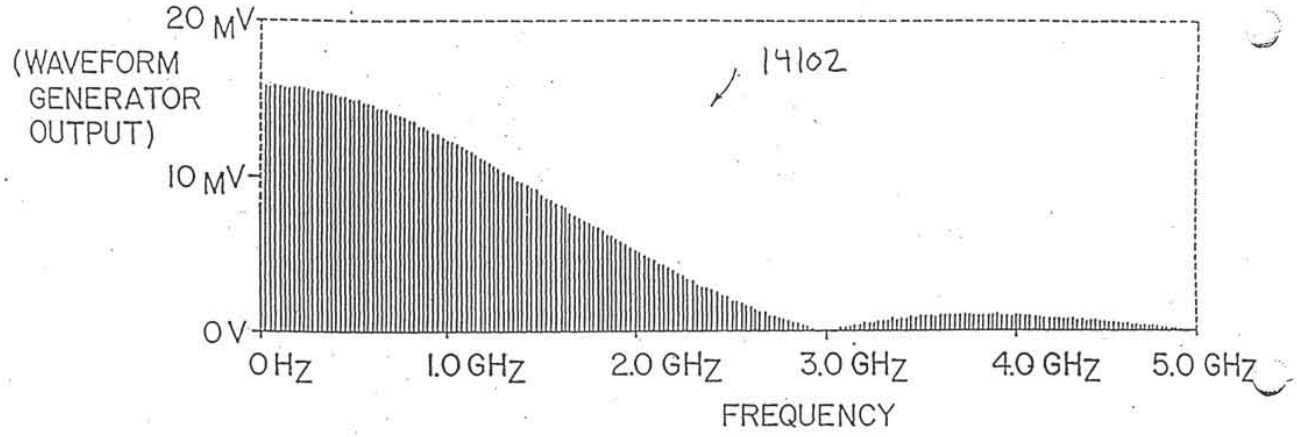


FIG. 141

09521879.030900

(WAVEFORM GENERATOR OUTPUT)
1.2 V
0 V
-1.2 V
0S
10NS
20NS
30NS
40NS
50NS
TIME
14202

FIG. 142

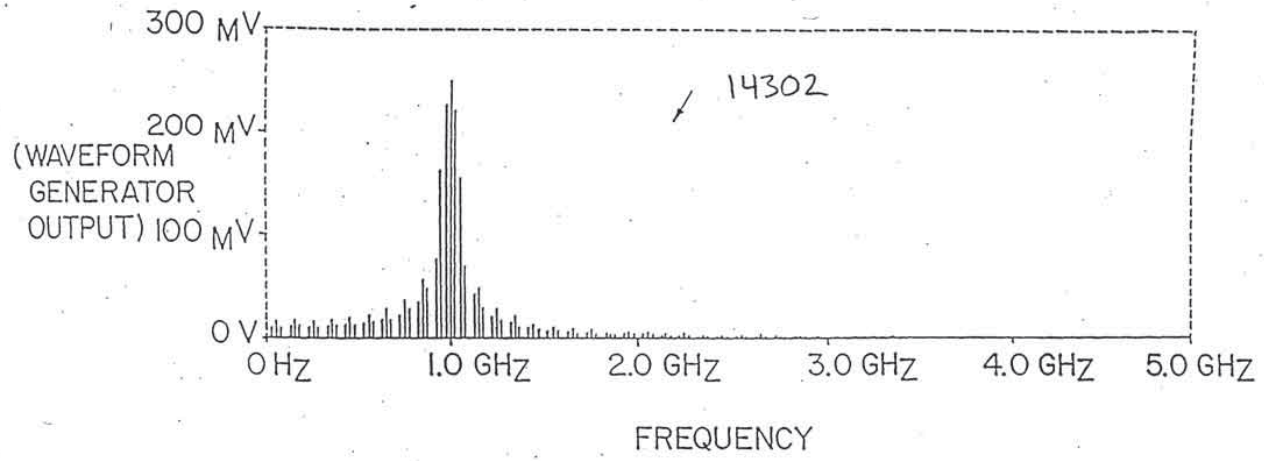


FIG. 143

09521879.030900

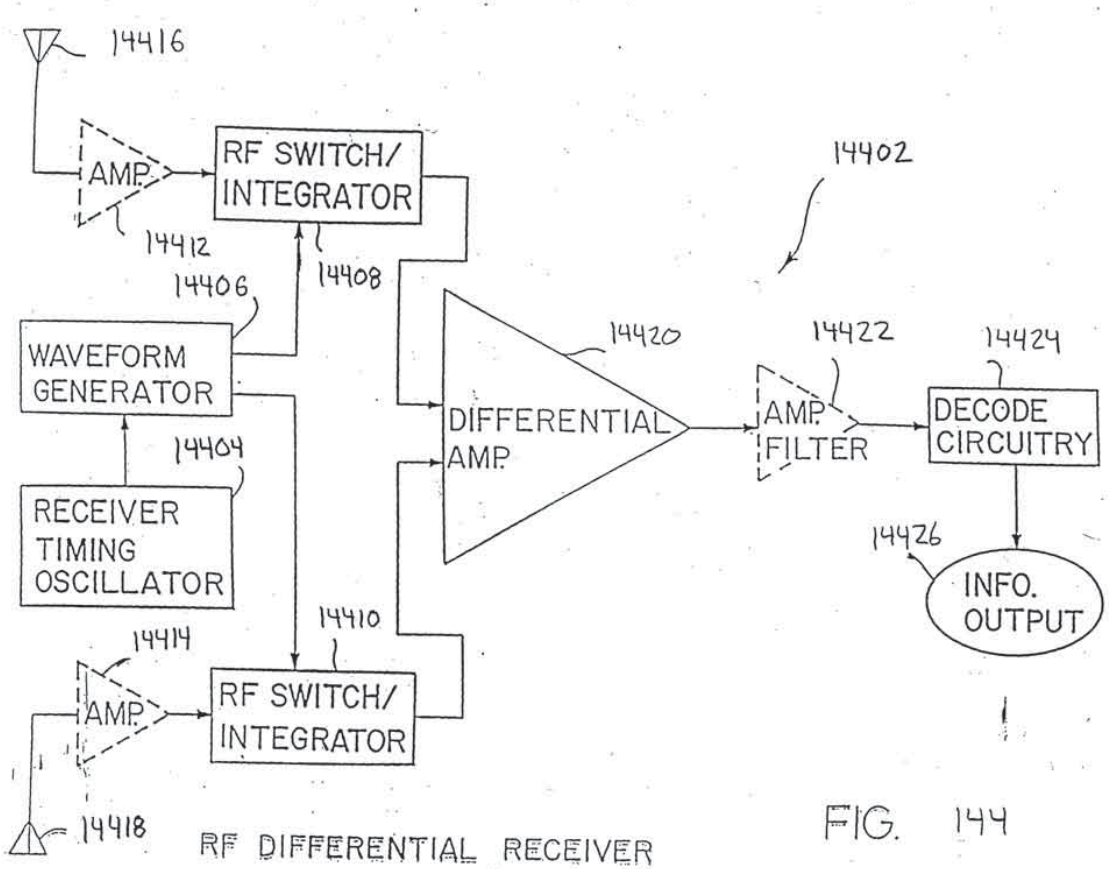


FIG. 144

09521879.030900

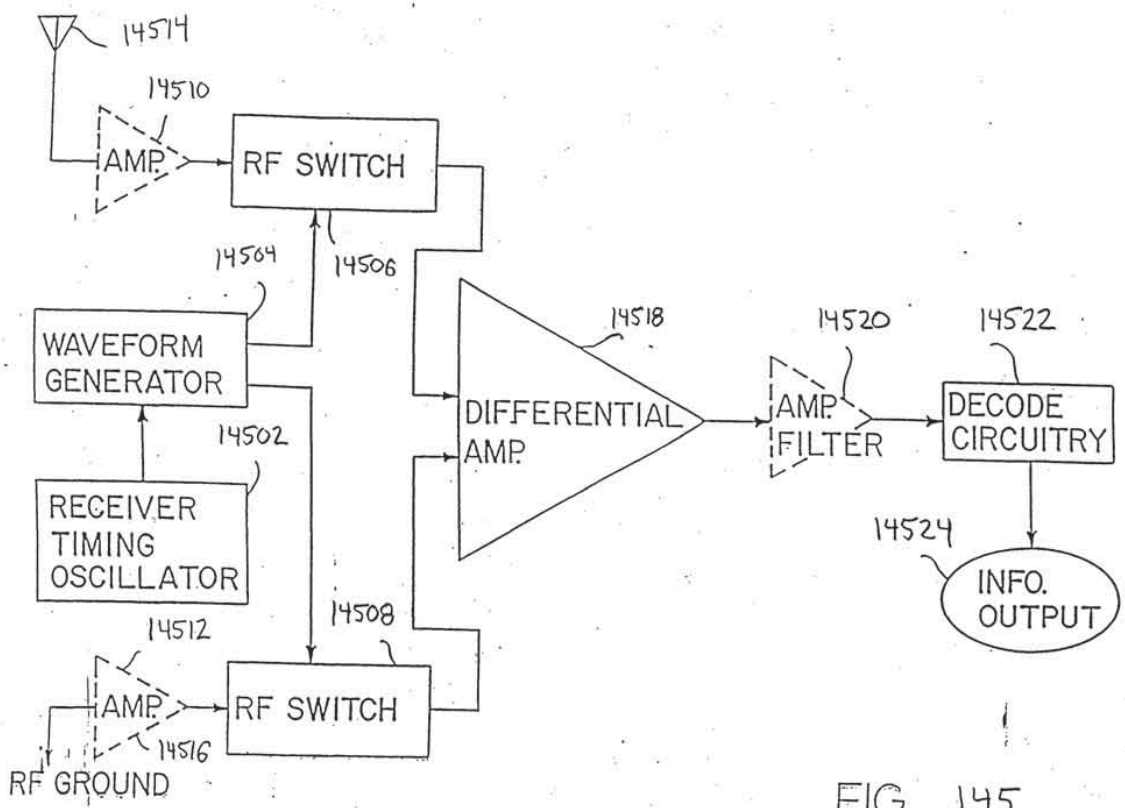
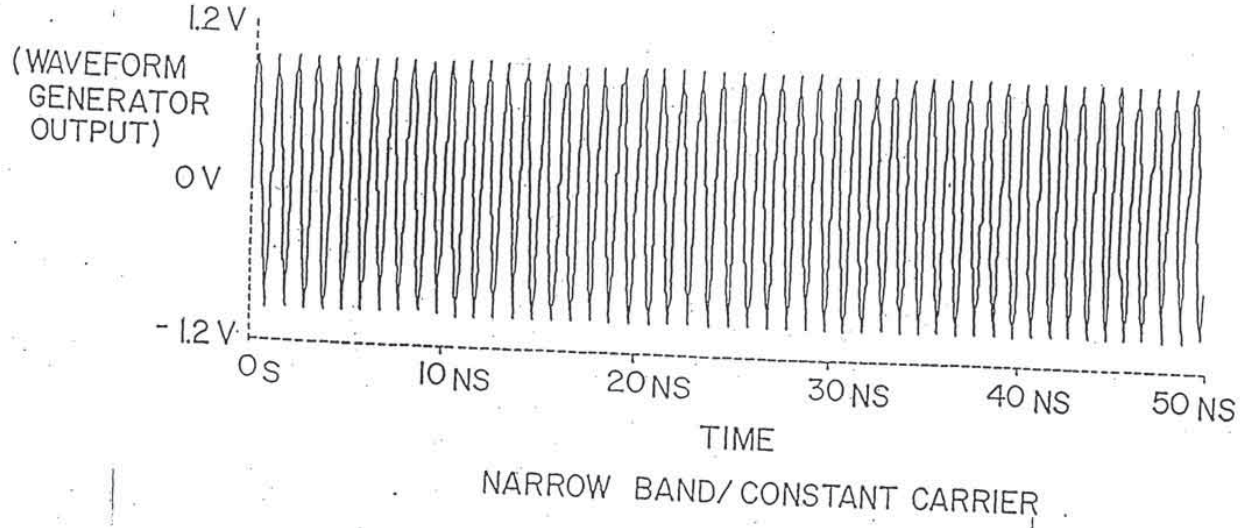


FIG. 145

PSEUDO DIFFERENTIAL RECEIVER

09521879.030900



NARROW BAND/ CONSTANT CARRIER

FIG. 146

09521879.030900

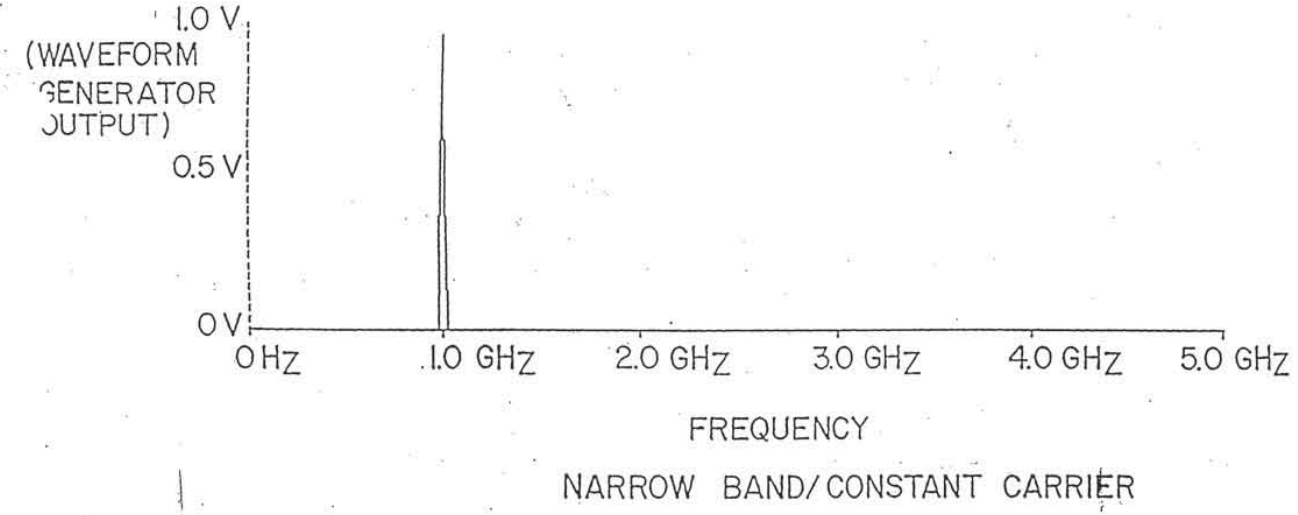


FIG. 147

09521879.030900

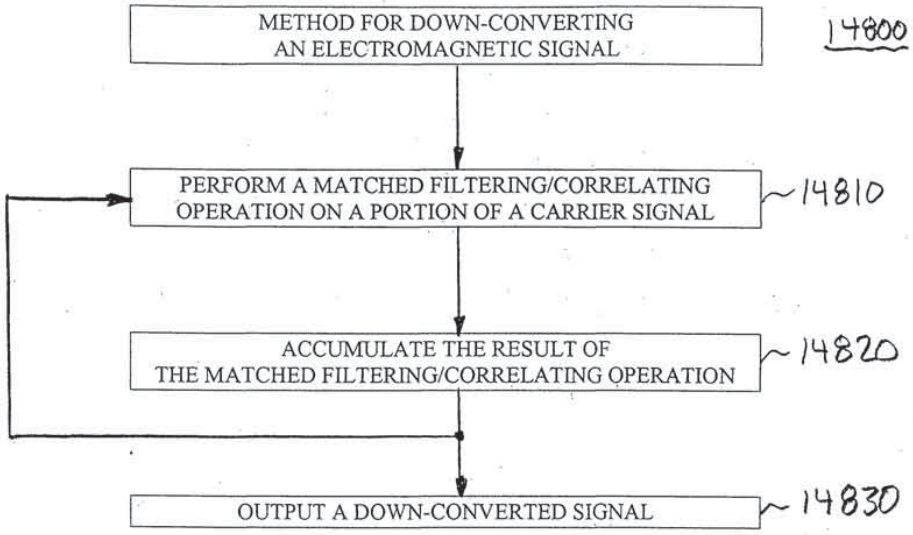

METHOD FOR DOWN-CONVERTING AN ELECTROMAGNETIC SIGNAL
14800
PERFORM A MATCHED FILTERING/CORRELATING OPERATION ON A PORTION OF A CARRIER SIGNAL
14810
ACCUMULATE THE RESULT OF THE MATCHED FILTERING/CORRELATING OPERATION
14820
OUTPUT A DOWN-CONVERTED SIGNAL
14830

FIG. 148

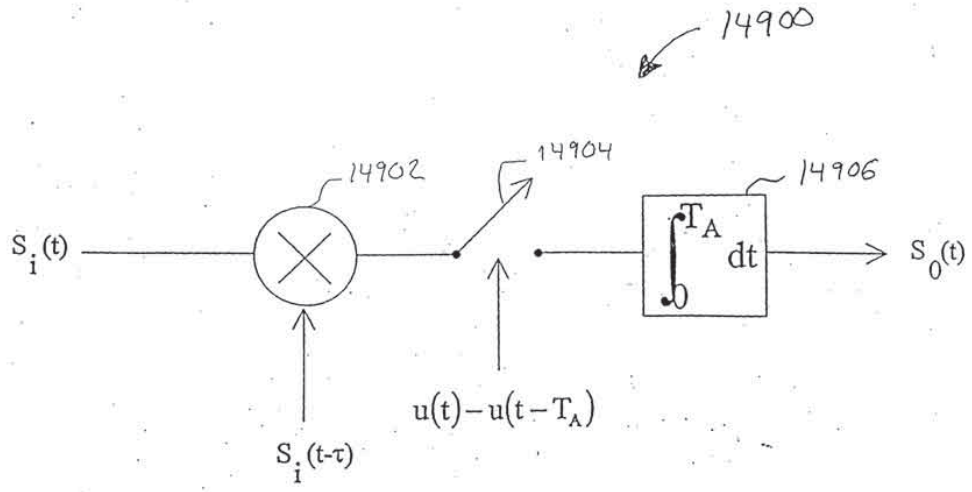


FIG. 149

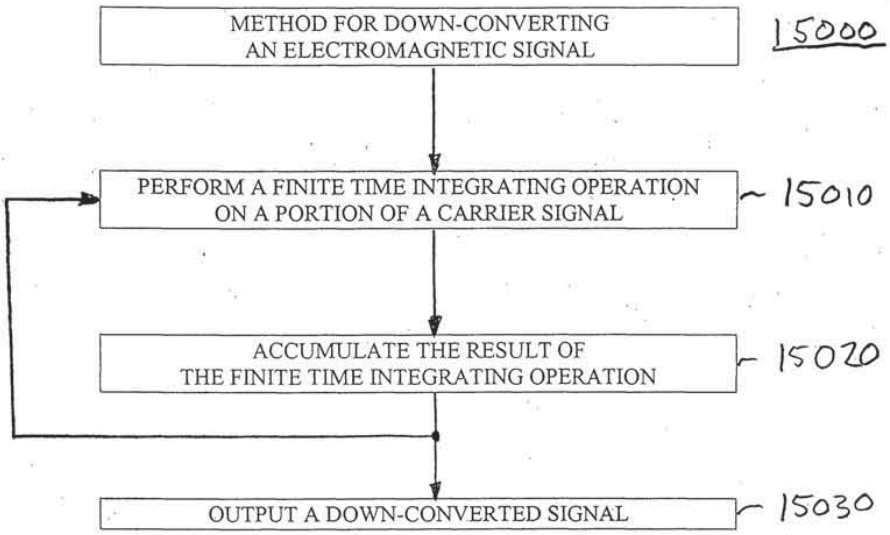


FIG. 150

0060020-0781560

FIG. 151

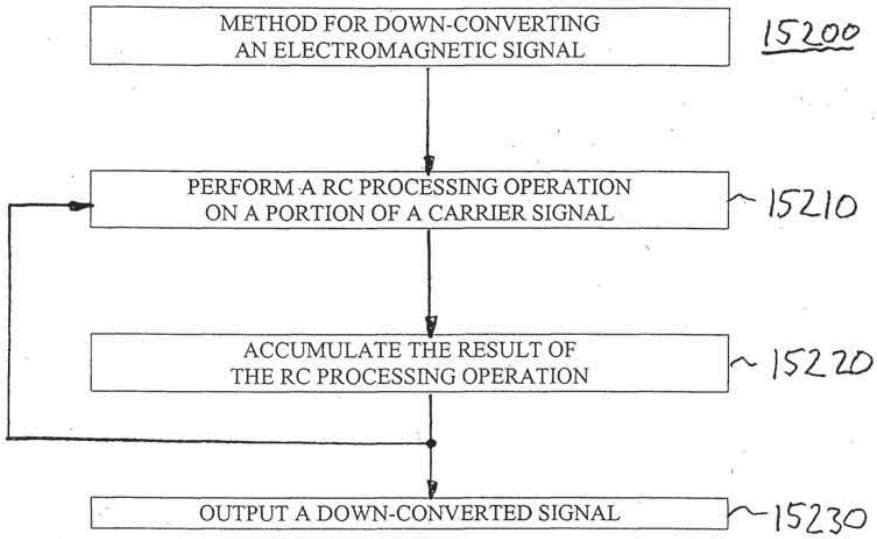

METHOD FOR DOWN-CONVERTING AN ELECTROMAGNETIC SIGNAL
15200
PERFORM A RC PROCESSING OPERATION ON A PORTION OF A CARRIER SIGNAL
15210
ACCUMULATE THE RESULT OF THE RC PROCESSING OPERATION
15220
OUTPUT A DOWN-CONVERTED SIGNAL
15230

FIG. 152

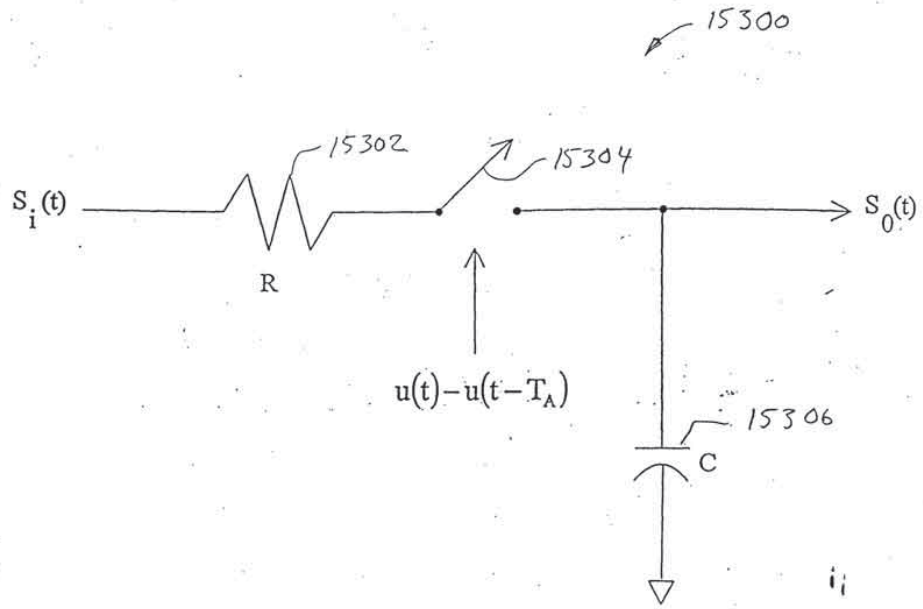


FIG. 153

09521979.030900

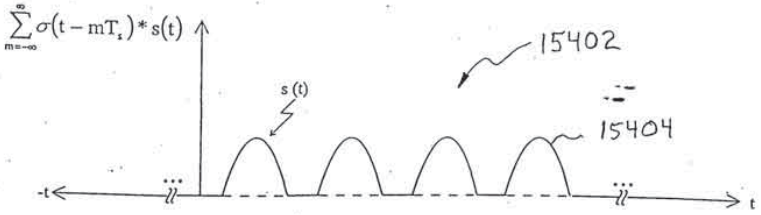


FIG. 154

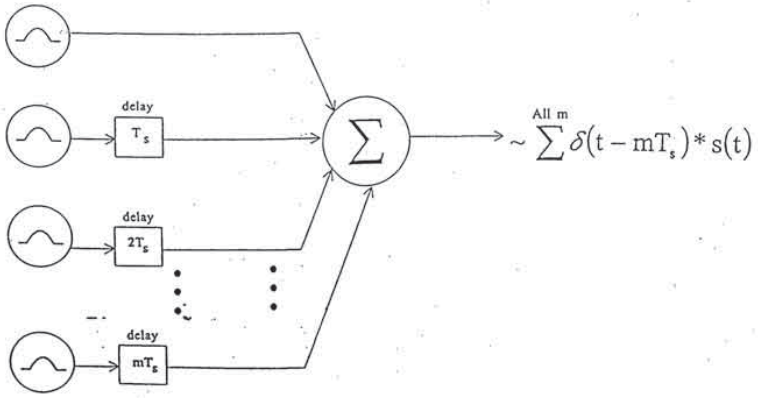


FIG. 155

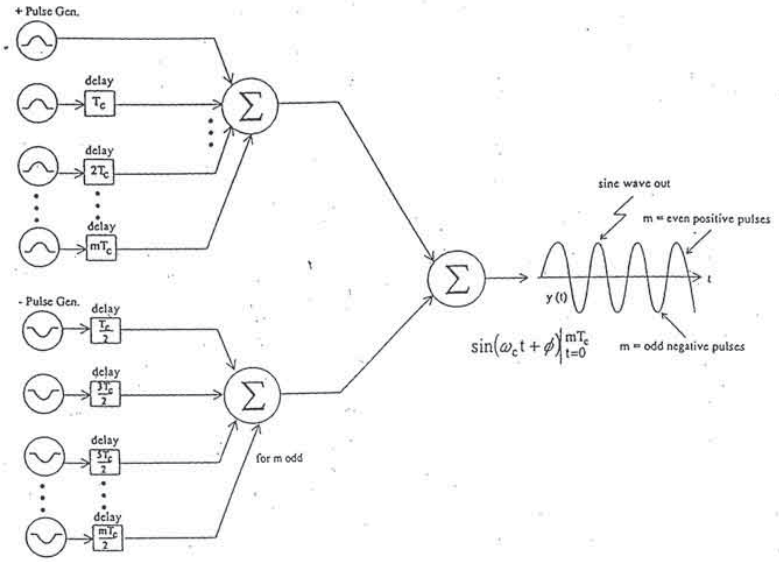
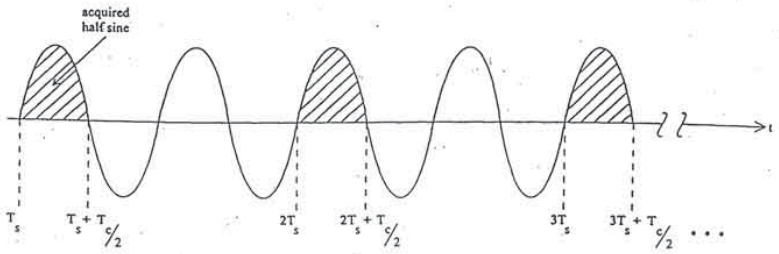

+ Pulse Gen.
delay
T_c
delay
$2T_c$
delay
mT_c
- Pulse Gen.
delay
$\frac{T_c}{2}$
delay
$\frac{3T_c}{2}$
delay
$\frac{3T_c}{2}$
delay
$\frac{mT_c}{2}$
for m odd
sine wave out
m = even positive pulses
y (t)
t
$\sin(\omega_c t + \phi)\Big|_{t=0}^{mT_c}$
m = odd negative pulses

FIG. 156



Carrier Processed by 3rd Harmonic UFT Processor

FIG. 157

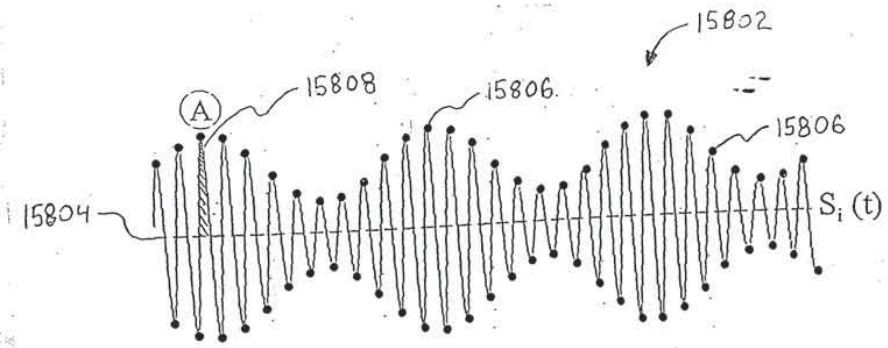


FIG. 158

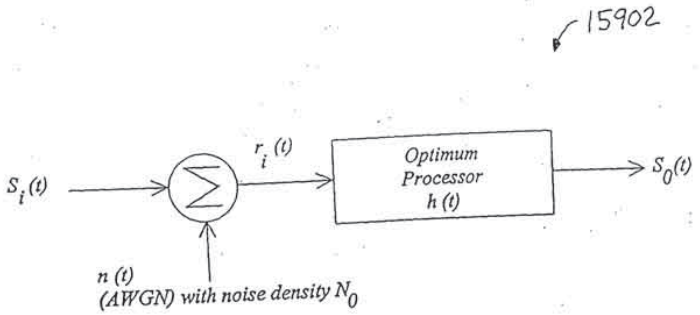


FIG. 159

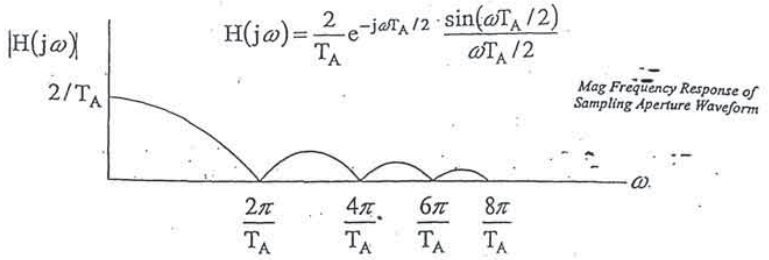
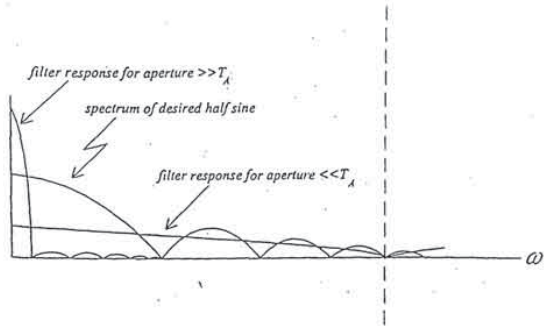


FIG. 160



Aperture Frequency Domain Representation

FIG. 161

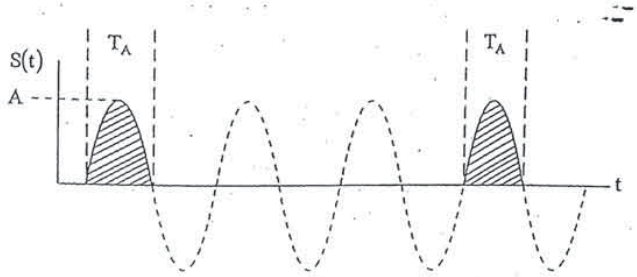


FIG. 162

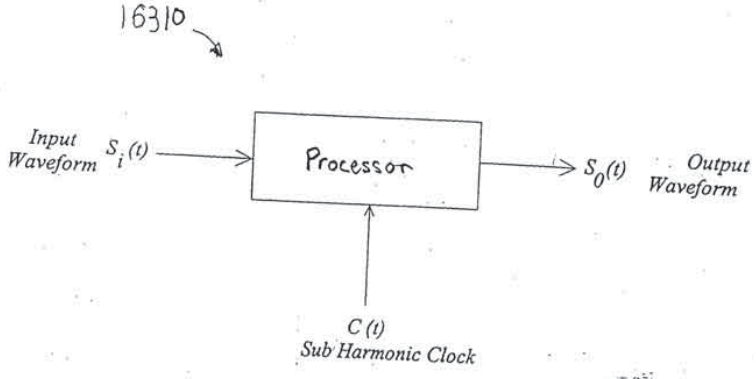


FIG. 163

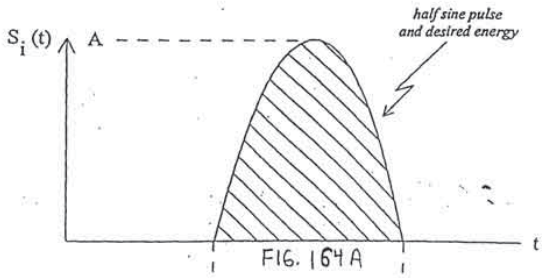


FIG. 164A

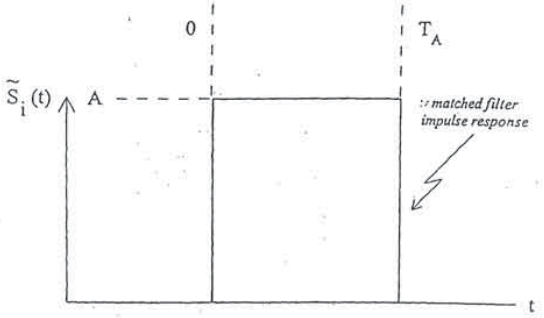


FIG. 164B

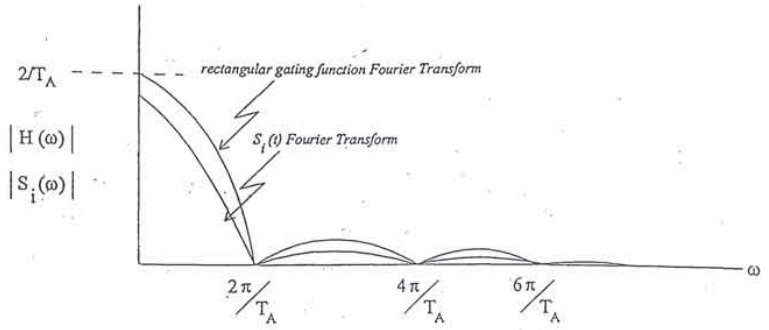

2/T_A
|H(ω)|
|S_i(ω)|
rectangular gating function Fourier Transform
S_i(t) Fourier Transform
2π/T_A
4π/T_A
6π/T_A
ω

FIG. 164C

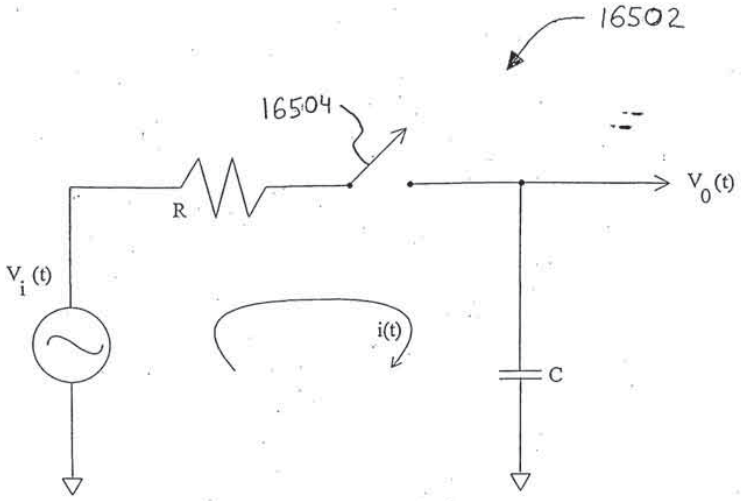


FIG. 165

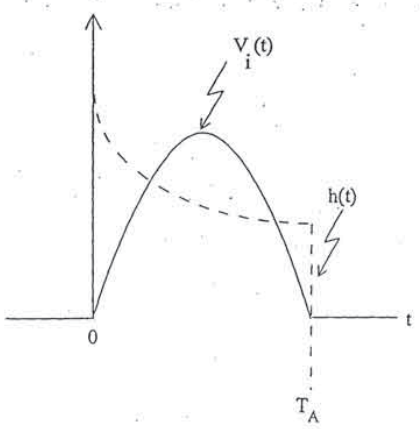


FIG. 166

FIG. 16'

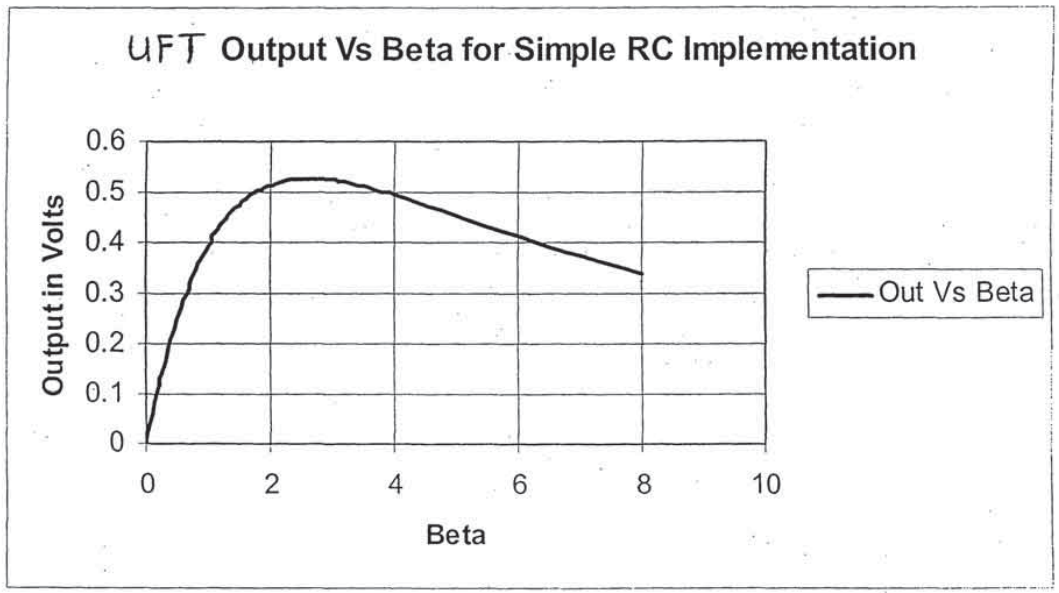

UFT Output Vs Beta for Simple RC Implementation
Output in Volts
0.6
0.5
0.4
0.3
0.2
0.1
0
0
2
4
6
8
10
Beta
Out Vs Beta

FIG. 168

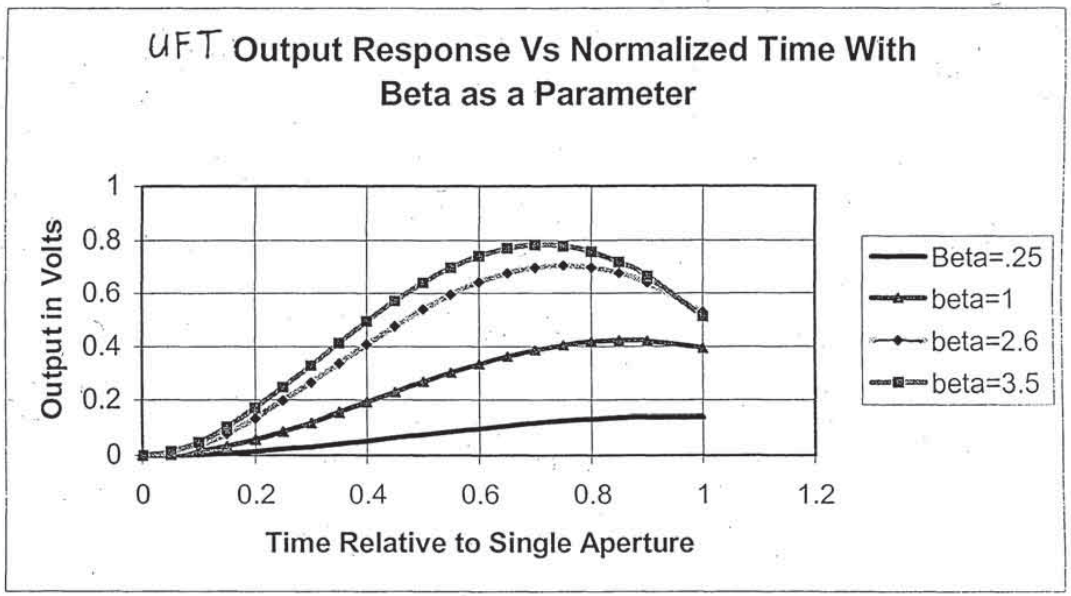

UFT Output Response Vs Normalized Time With Beta as a Parameter
Output in Volts
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
1.2
Time Relative to Single Aperture
Beta=.25
beta=1
beta=2.6
beta=3.5

FIG. 169

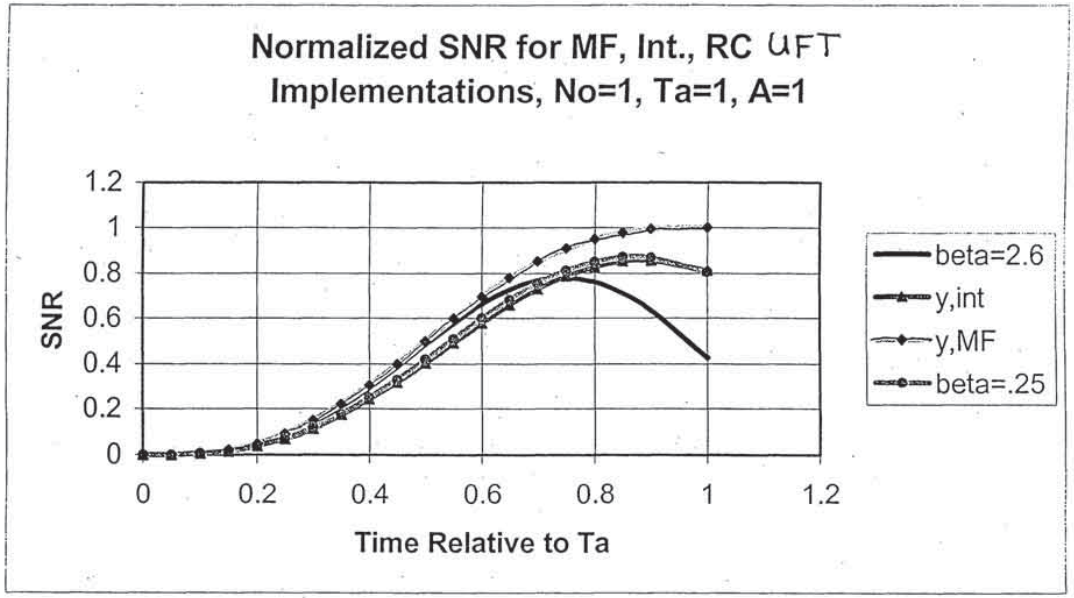


FIG. 170

09521879.030900

FIG. 17

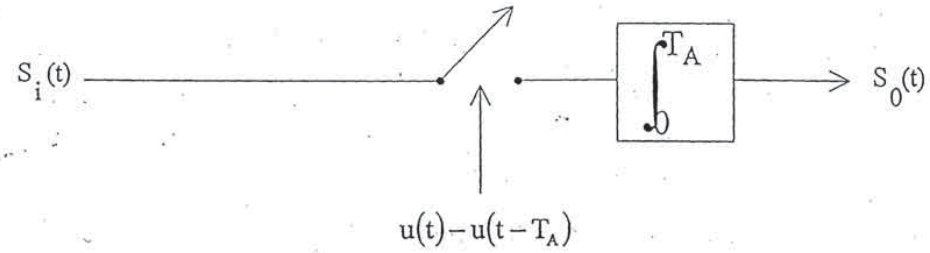


FIG. 172

09521879.030900

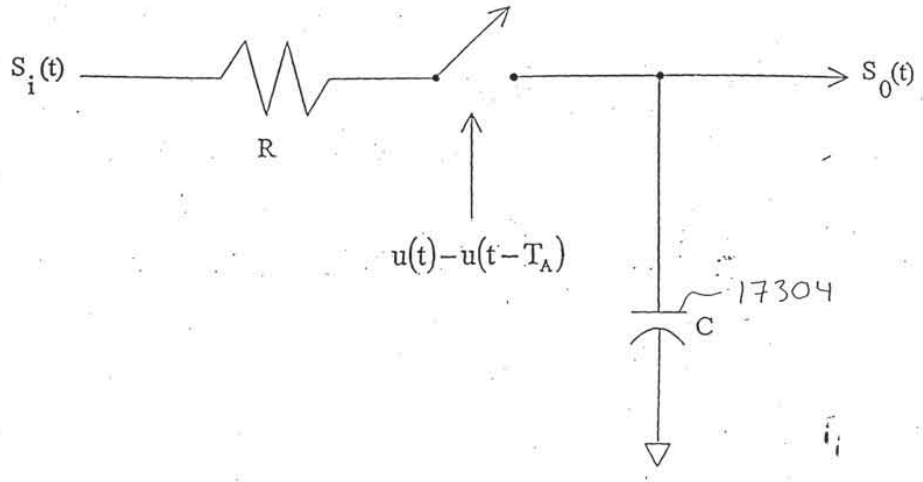


FIG. 173

09521879.030900

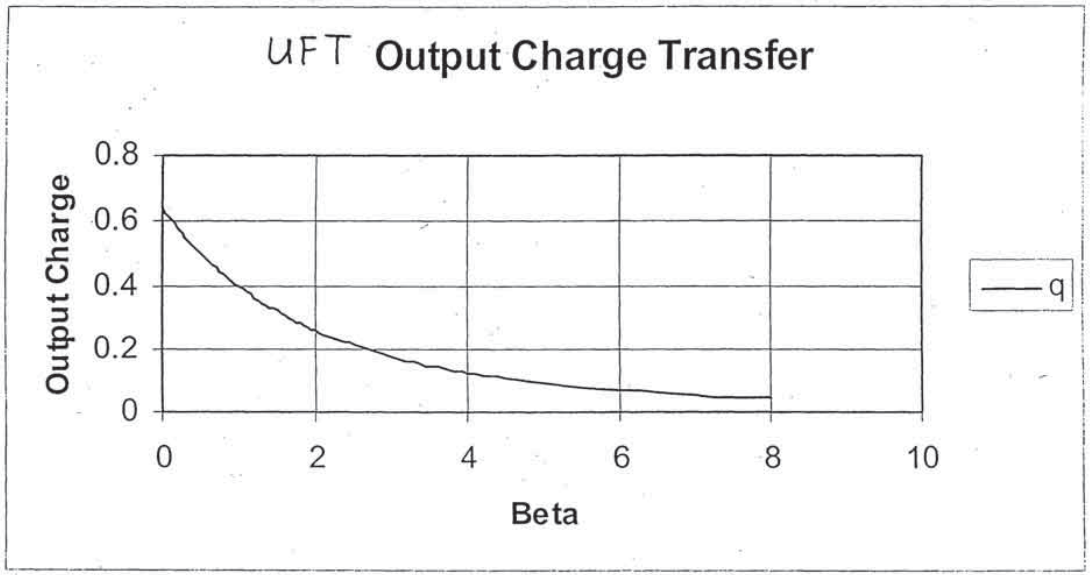

UFT Output Charge Transfer
Output Charge
0.8
0.6
0.4
0.2
0
0
2
4
6
8
10
Beta
q

FIG. 17A

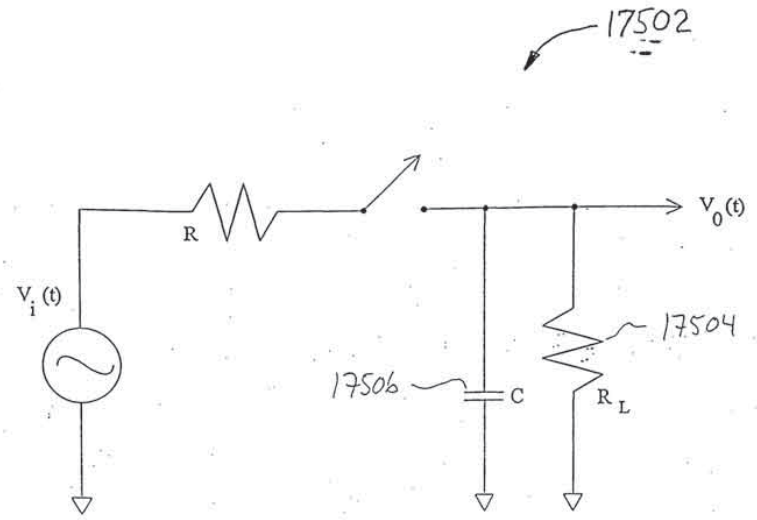


FIG. 175

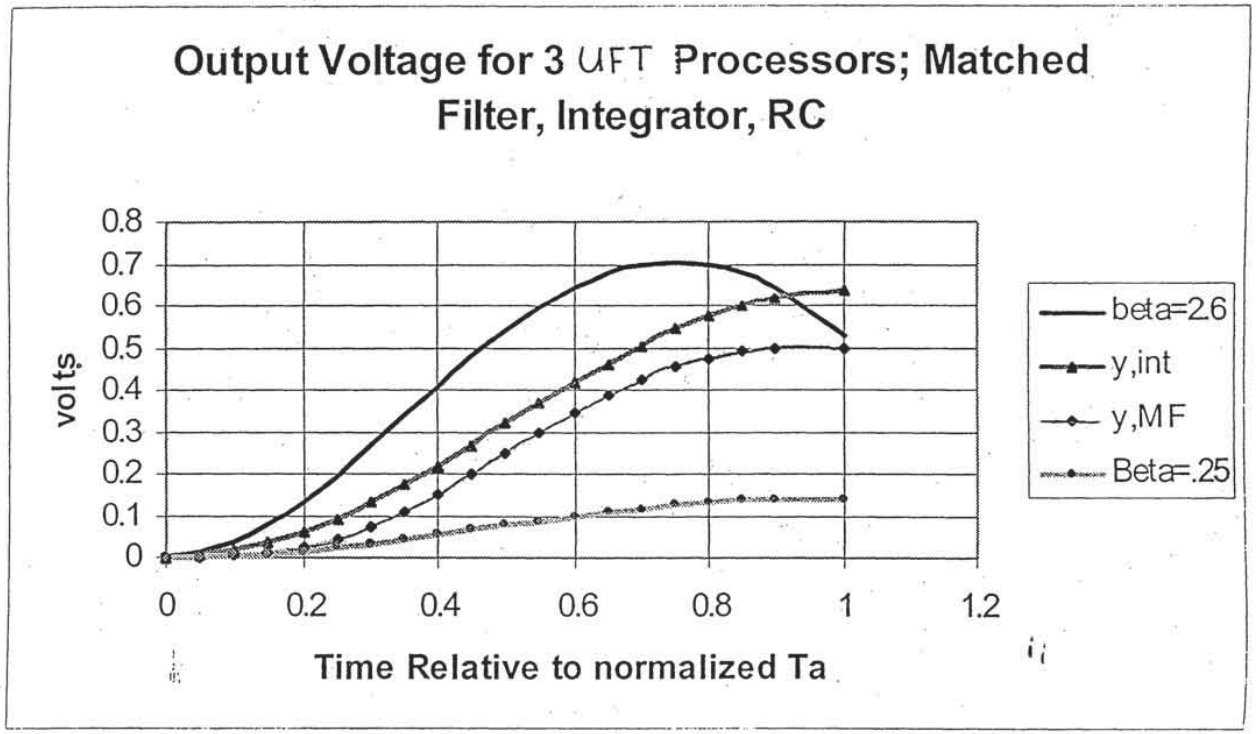


FIG. 17G

09521879.030909

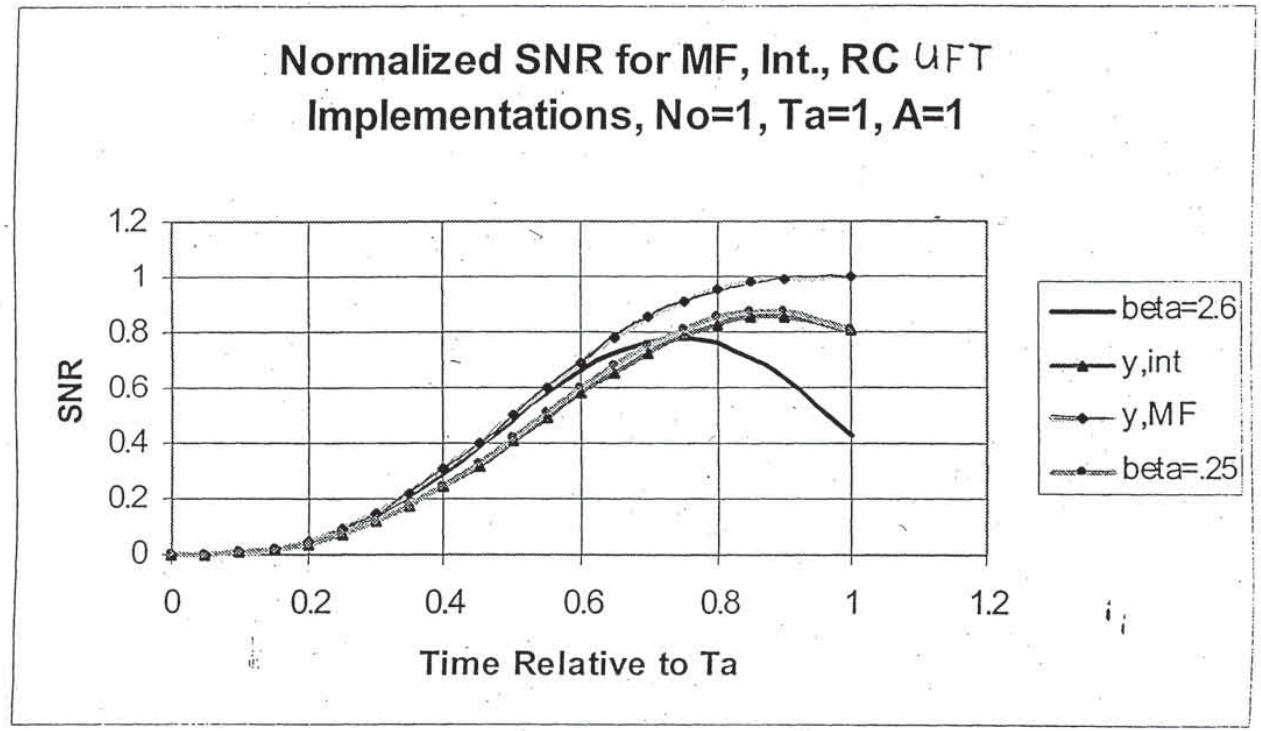


FIG. 17

09521879.030900

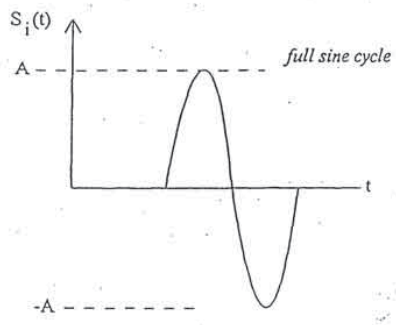


FIG. 178A

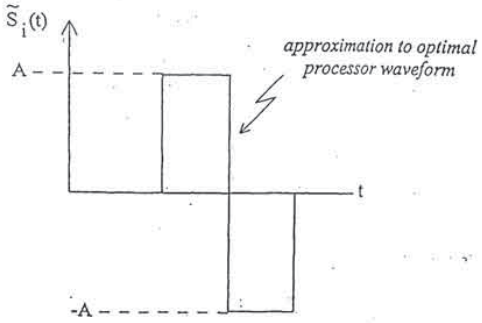


FIG. 178B

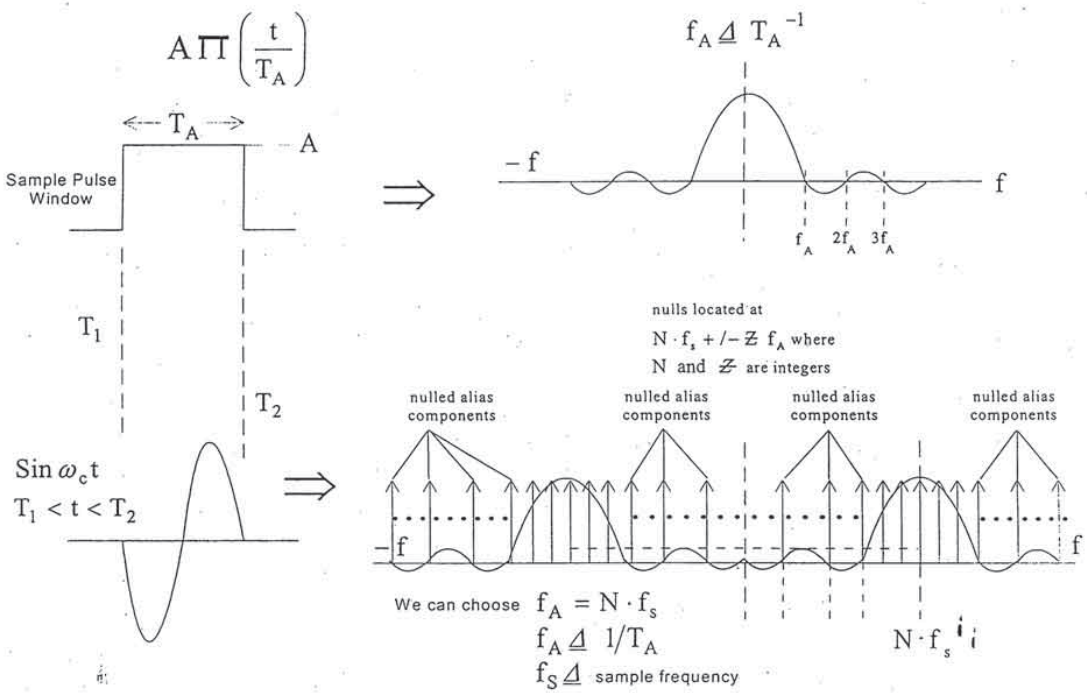


FIG. 179

09521870.030900

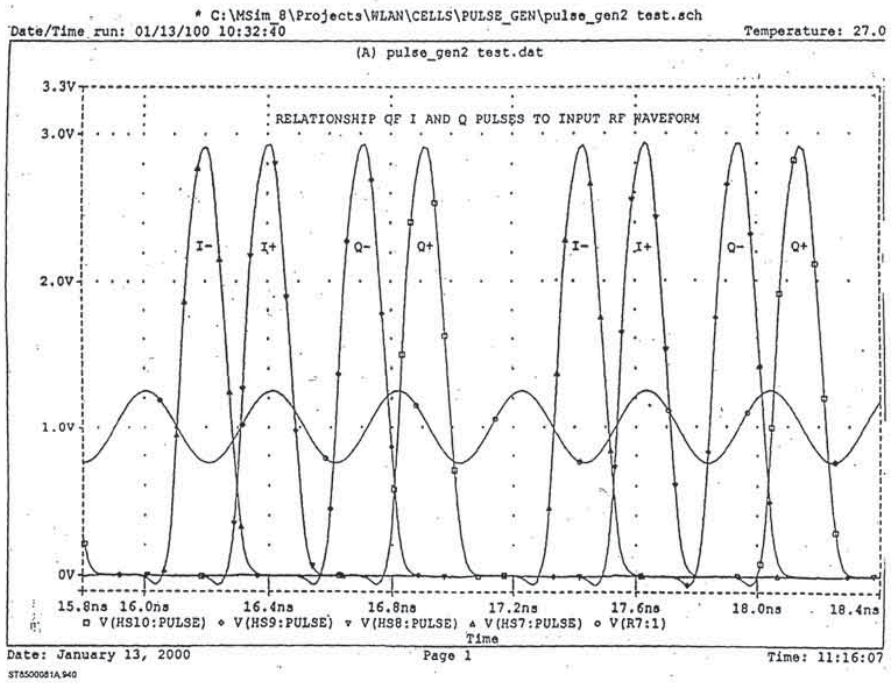


FIG. 18.0

095218?0.030900

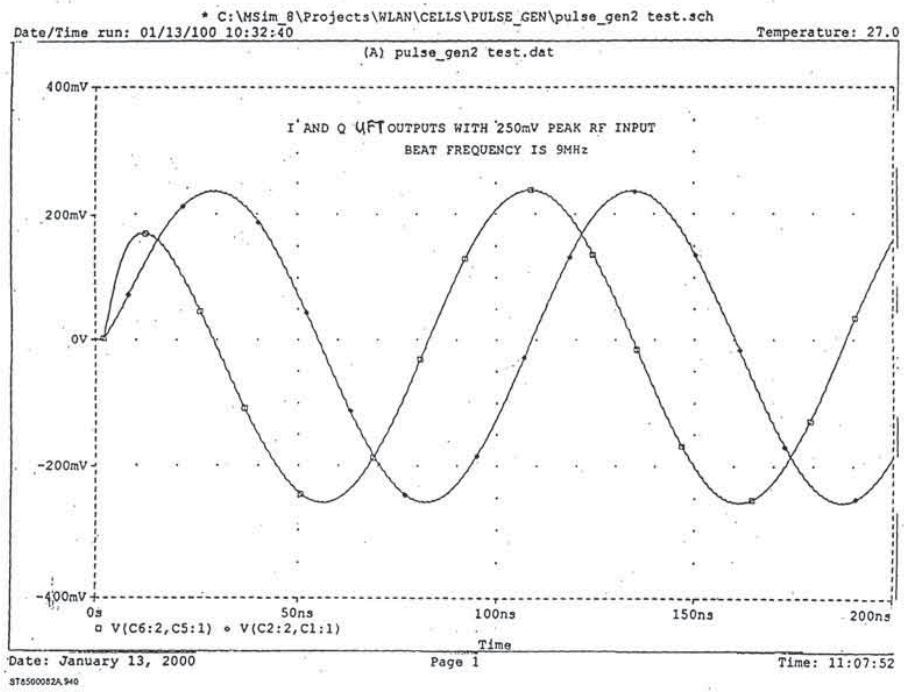


FIG. 181

095219 9.030900

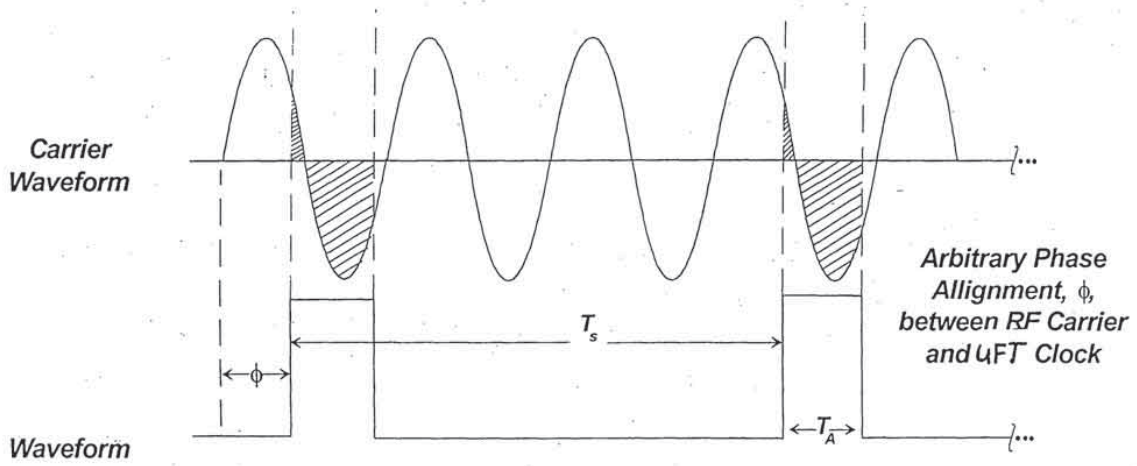


FIG. 182

09521919.030900

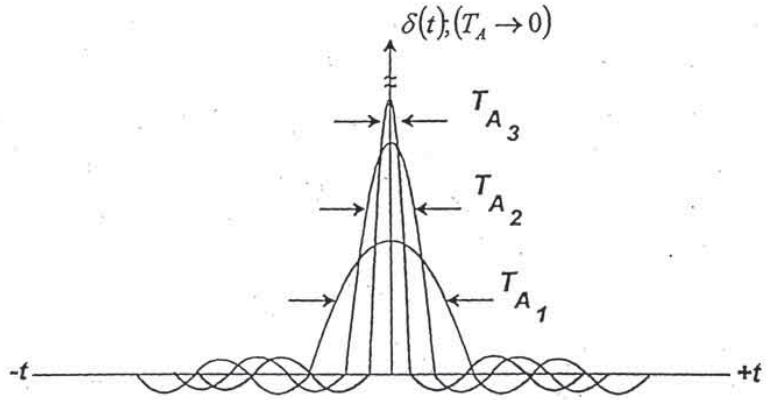


FIG. 183

1147

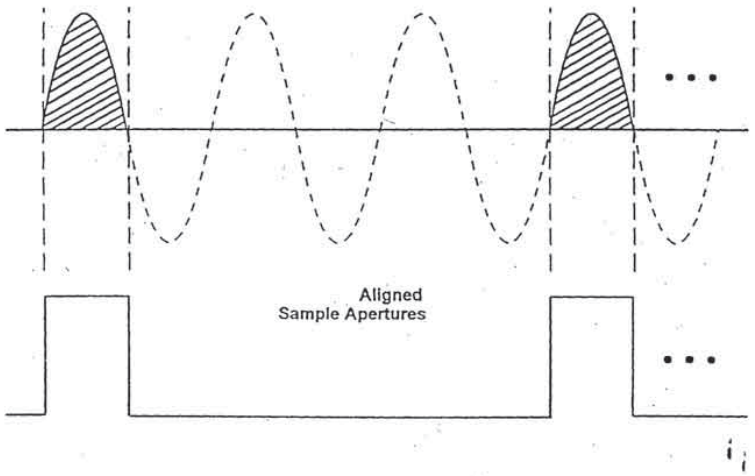


FIG. 184

09521999.030900

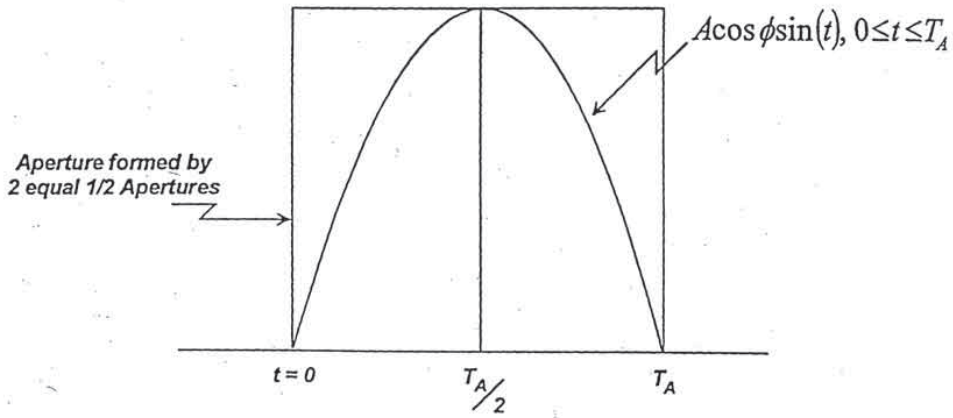


FIG. 185

09521879.030900

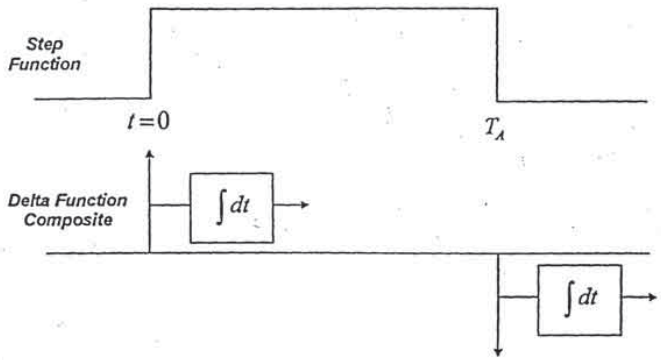

Step Function
t=0
T_A
Delta Function Composite
∫dt
∫dt
$u=(t)-u(t-T_A)$
$\int\delta(t)dt-\int\delta(t-T_A)dt$

FIG. 186

1150

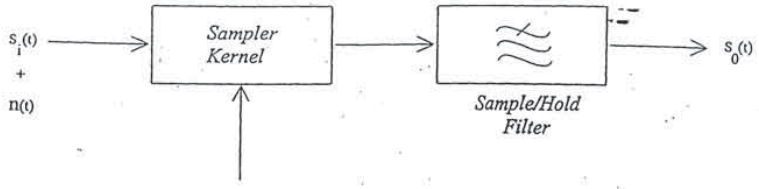


FIG. 187

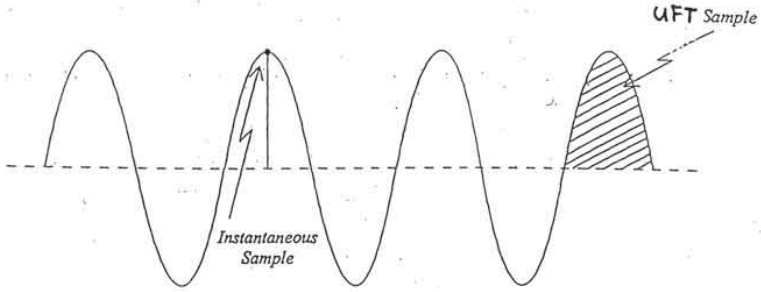


FIG. 188

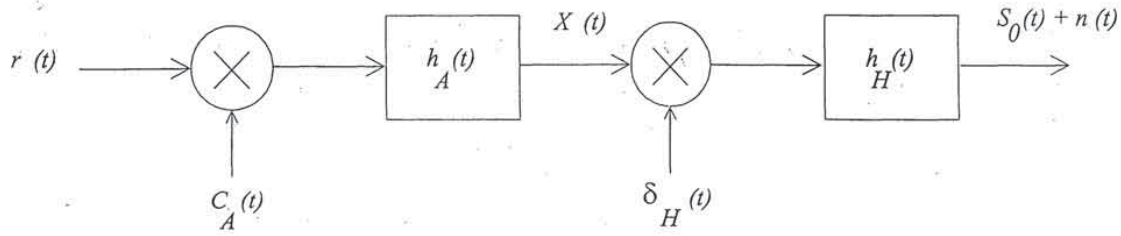


FIG. 189

095219?9.030900

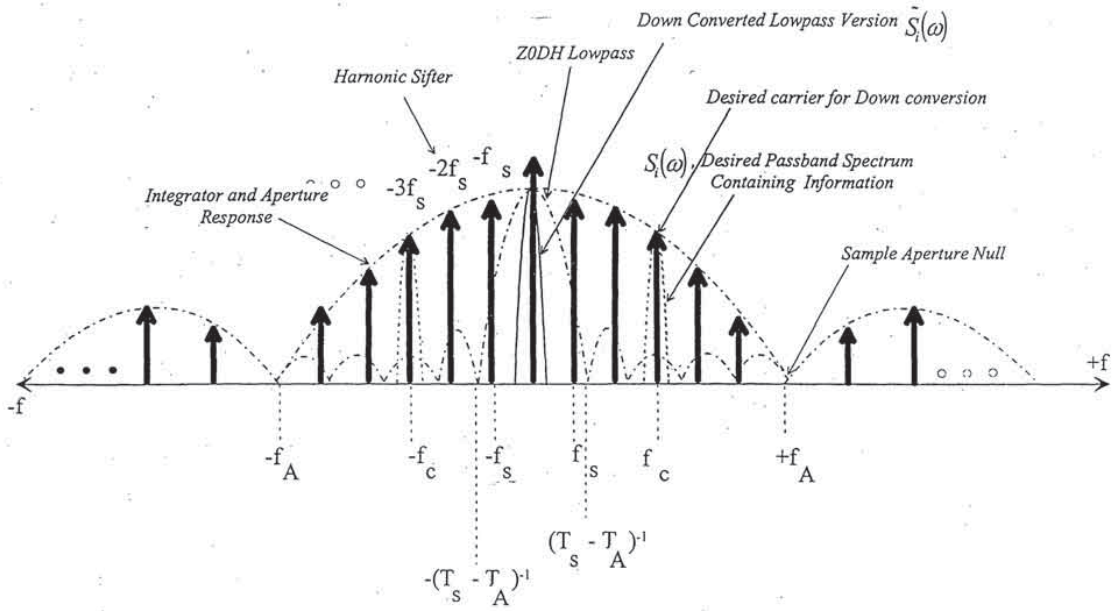


FIG. 190

09521879.030900

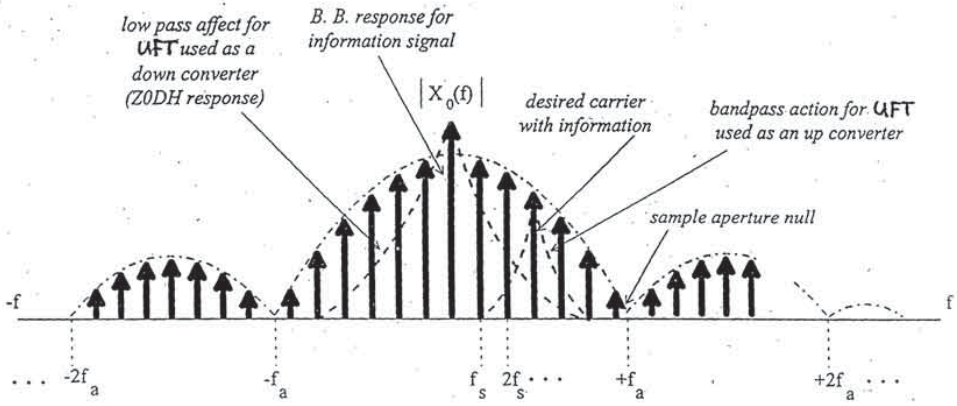


FIG. 191

095219T9.030900

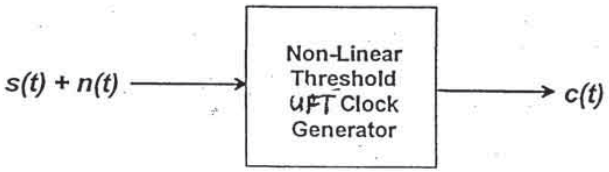


FIG. 192

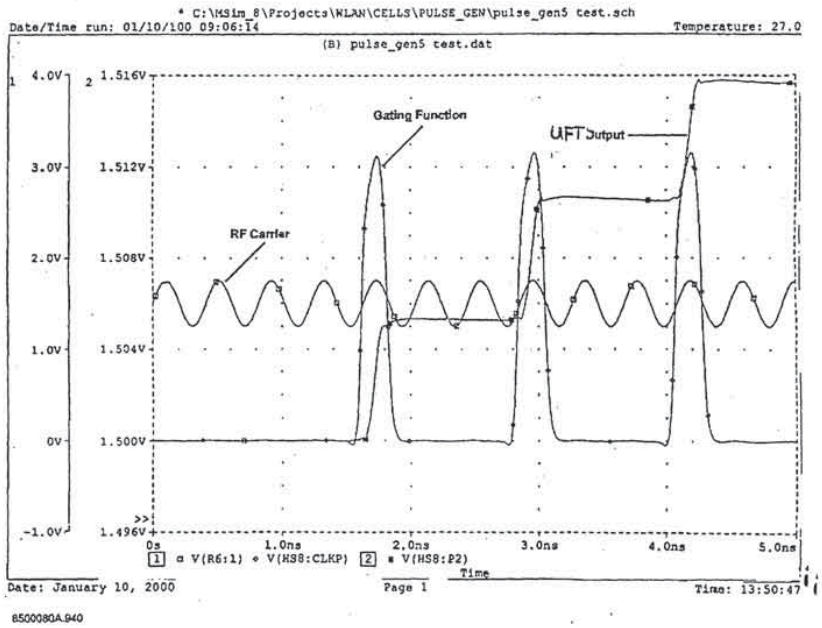


FIG. 193

09521979.030909

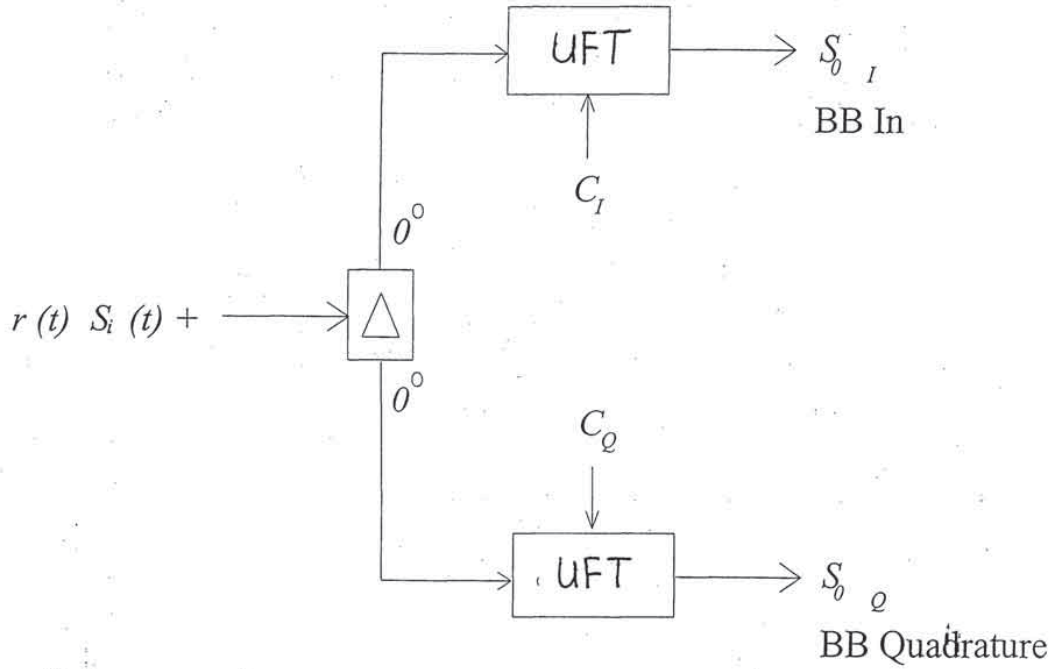


FIG. 194

095219 .030000

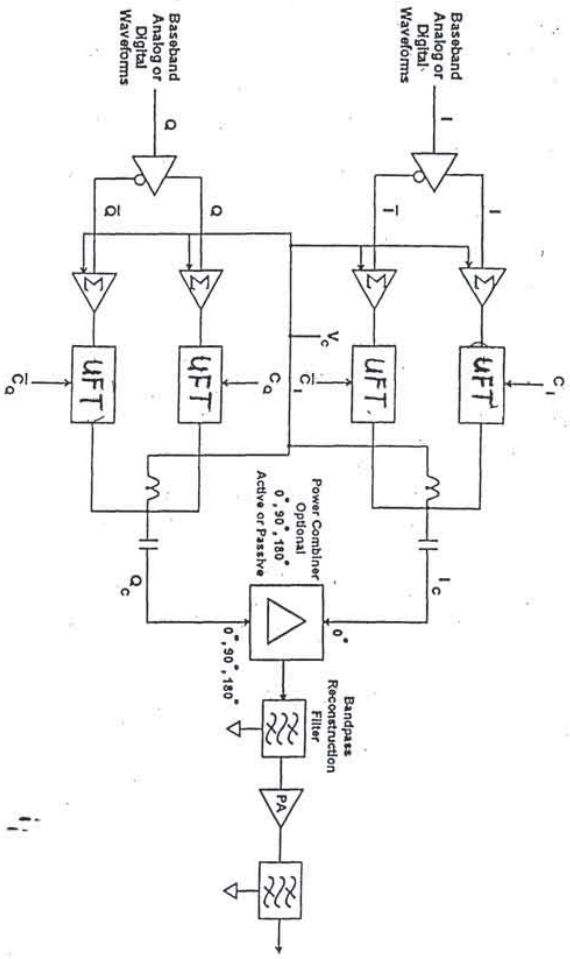

Baseband Analog or Digital Waveforms
Q
Baseband Analog or Digital Waveforms
I
UFT
UFT
UFT
UFT
Power Combiner Optional 0°, 90°, 180° Active or Passive
0°, 90°, 180°
0°
Bandpass Reconstruction Filter
PA

FIG. 195

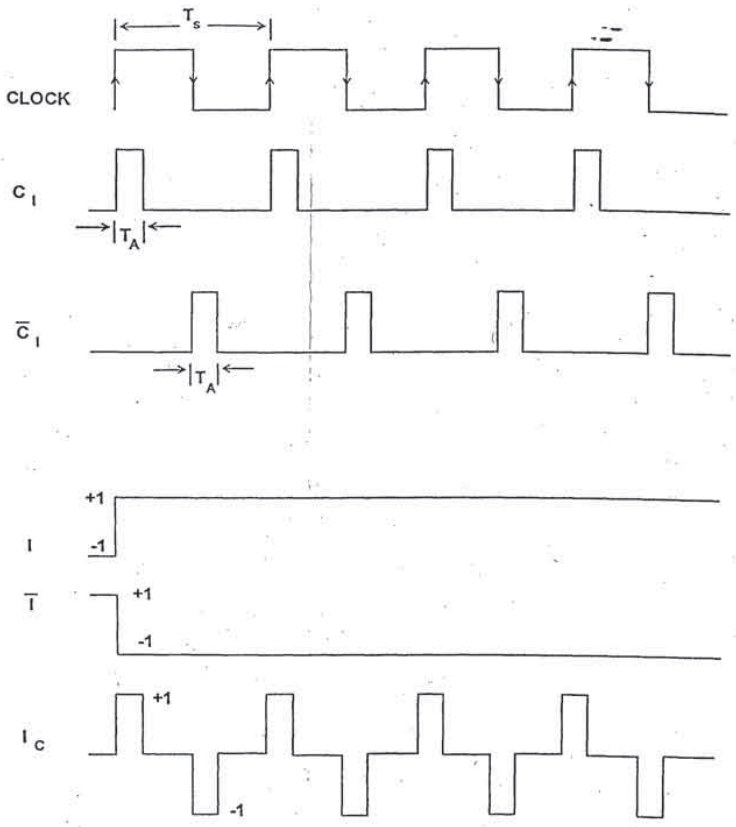


FIG. 196

UFT Module
UFT Module
UFT Module
UFT Module
LNA (opt.)
Q Baseband output signal
I Baseband output signal

Fig. 197

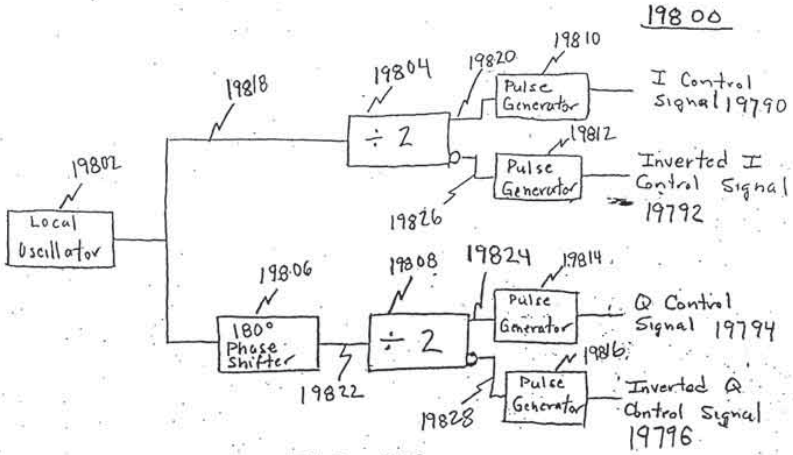


FIG. 198

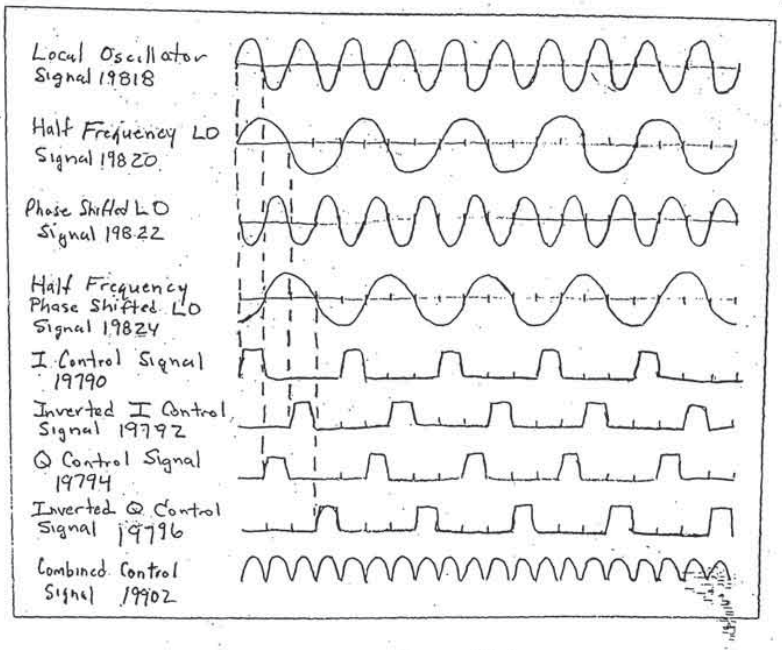


FIG. 199

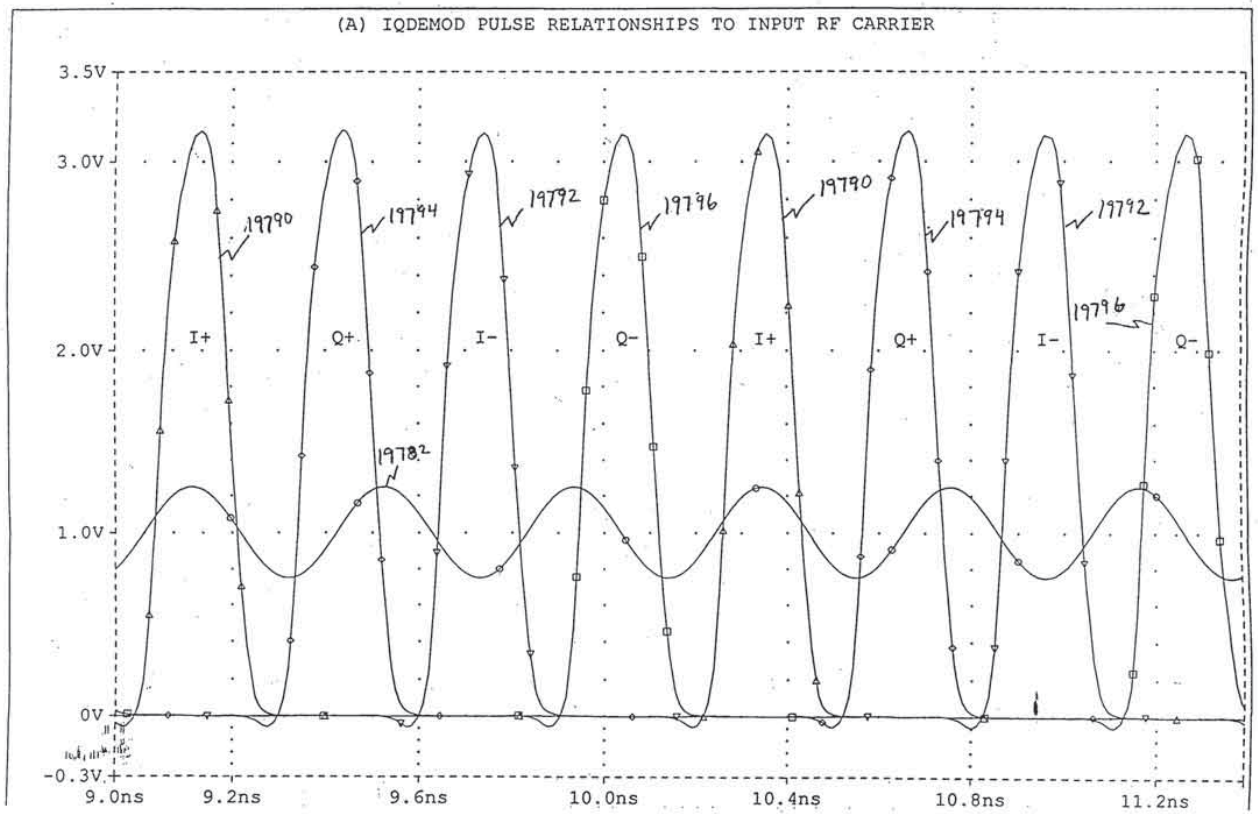


FIG. 200

095218T9.030900

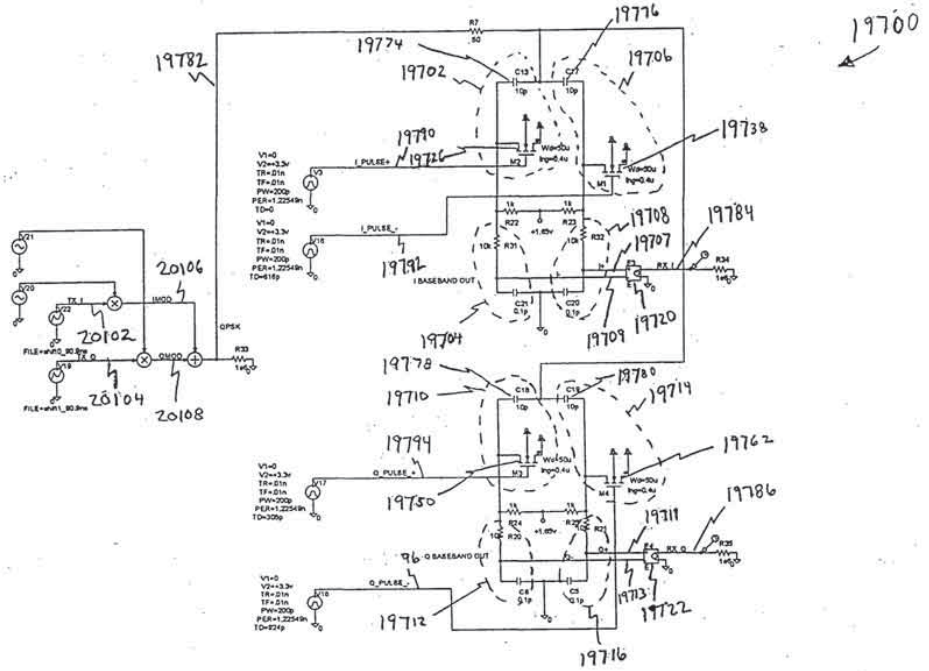

19700
19782
19774
19776
19702
19706
19738
19790
19726
19708
19784
19707
19792
19704
19709
19720
19778
19780
19710
19714
19794
19762
19750
19786
19711
19712
19713
19722
19716
20106
20102
20104
20108
QPSK

FIG. 201

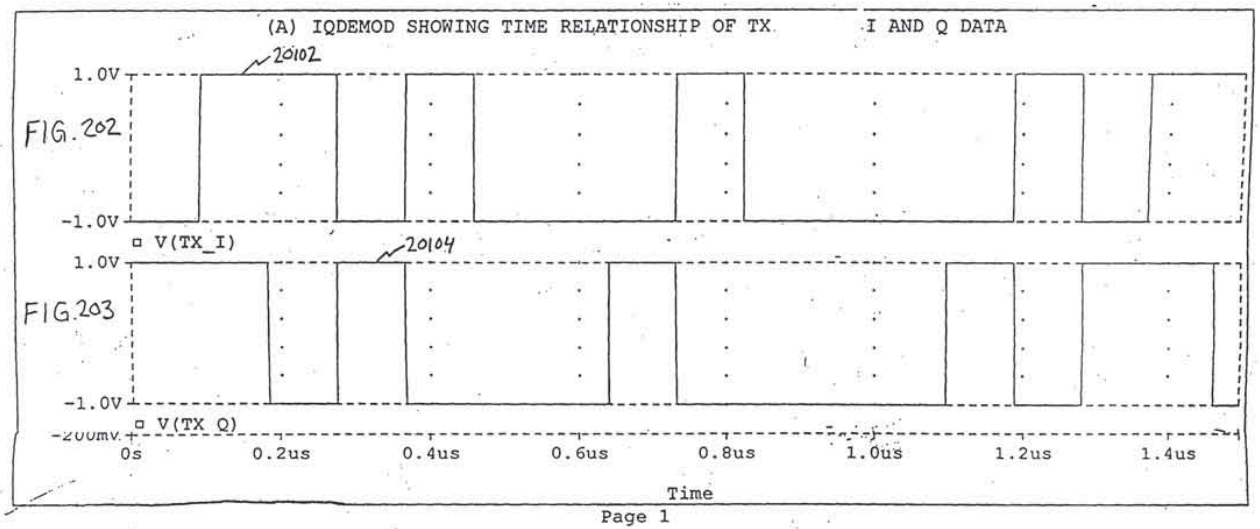
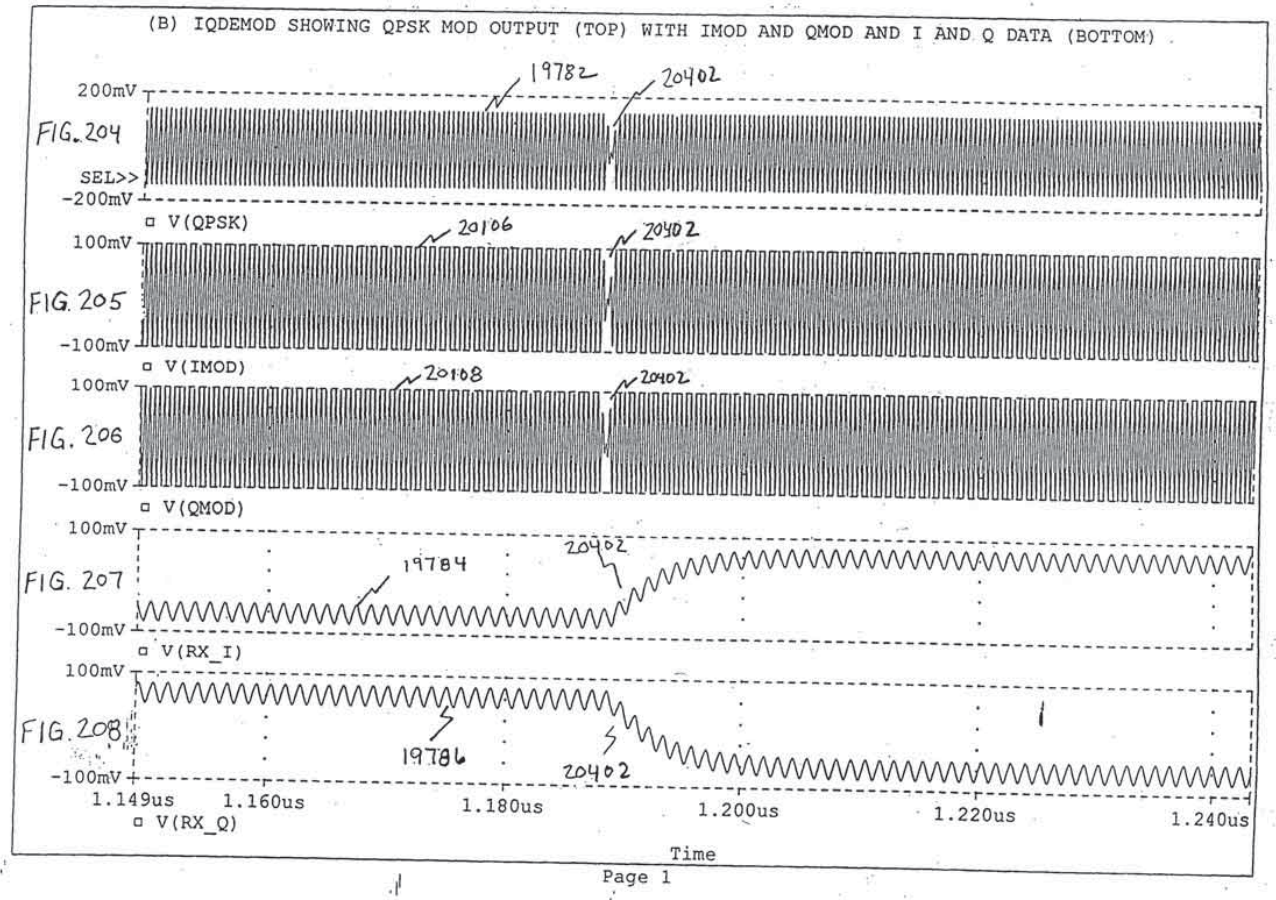


FIG. 202

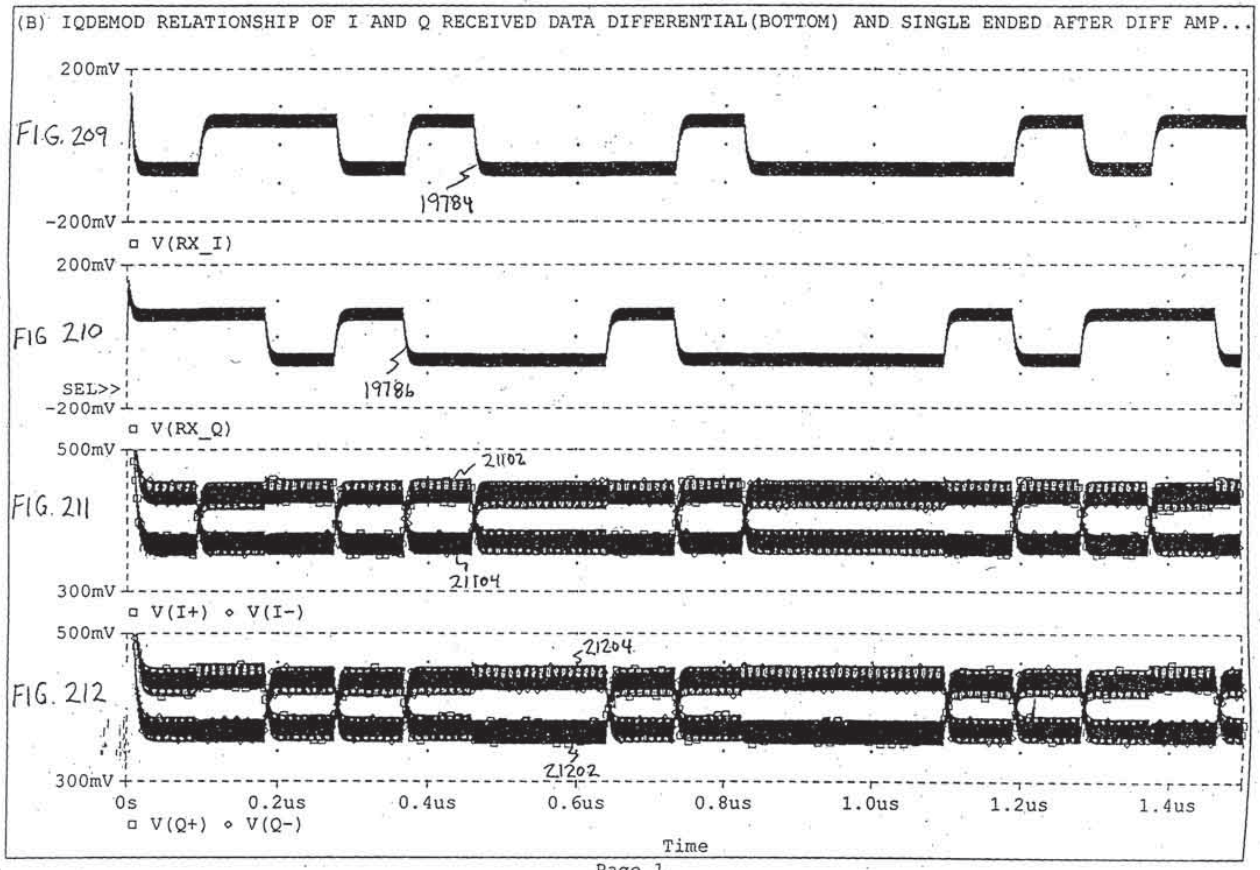
FIG. 203

Page 1

095218P9.030900


(B) IQDEMOD SHOWING QPSK MOD OUTPUT (TOP) WITH IMOD AND QMOD AND I AND Q DATA (BOTTOM)
FIG. 204
FIG. 205
FIG. 206
FIG. 207
FIG. 208
200mV
SEL>>
-200mV
V(QPSK)
100mV
-100mV
V(IMOD)
V(QMOD)
V(RX_I)
V(RX_Q)
19782
20402
20106
20108
19784
19786
1.149us
1.160us
1.180us
1.200us
1.220us
1.240us
Time
Page 1

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Page 1

09521879.030900

1166

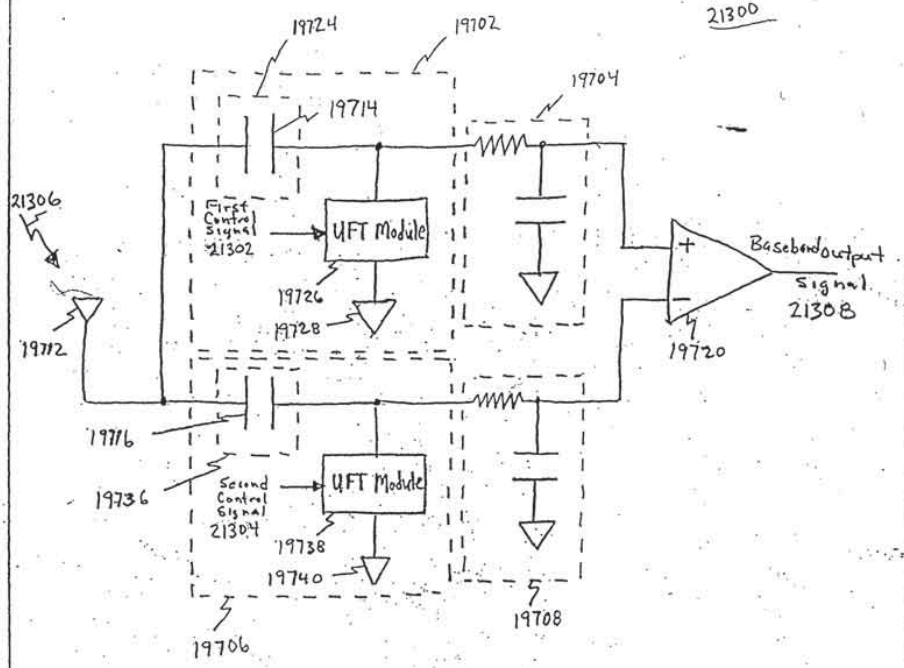

21300
19724
19702
19704
19714
21306
First Control Signal 21302
UFT Module
19726
19728
19712
Baseband output signal 21308
19720
19716
19736
Second Control Signal 21304
UFT Module
19738
19740
19708
19706

FIG. 213

IN ' UNITED STATES PATENT AND ' DEMARK OFFICE

jc784 U.S. PTO 03/09/00

In re application of:

Sorrells *et al.*

Appl. No. (*to be assigned*)
(Continuation-In-Part of Appl. 09/293,342)

Filed: (*herewith*)

For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**

Art Unit: (*to be assigned*)

Examiner: (*to be assigned*)

Atty. Docket: 1744.0010003

jc511 U.S. PTO 09/521879 03/09/00

Authorization To Treat A Reply As Incorporating An Extension Of Time Under 37 C.F.R. § 1.136(a)(3)

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

The U.S. Patent and Trademark Office is hereby authorized to treat any concurrent or future reply that requires a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. The U.S. Patent and Trademark Office is hereby authorized to charge all required extension of time fees to our Deposit Account No. 19-0036, if such fees are not otherwise provided for in such reply. A duplicate copy of this authorization is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Date: 3/9/2000

1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

P:\USERS\VBEASTON\1744.0010003\APP.EOT SKGF Rev. 7/7/98

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Sorrells *et al.*

Appl. No. (*to be assigned*)
(Continuation-In-Part of Appl. 09/293,342)

Filed: (*herewith*)

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Examiner: (*to be assigned*)

Atty. Docket: 1744.0010003

DUPLICATE

jc511 U.S. PTO
09/521879
03/09/00

Authorization To Treat A Reply As Incorporating An Extension Of Time Under 37 C.F.R. § 1.136(a)(3)

Assistant Commissioner for Patents
Washington, D.C. 20231

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STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Date: 3/9/2000

1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

FORMALITIES LETTER

OC000000005125679

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENT AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/521,879	03/09/2000	David F. Sorrells	1744.0010003

Sterne Kessler Goldstein & Fox PLLC
1100 New York Avenue NW
Suite 600
Washington, DC 20005-3934

Date Mailed: 05/18/2000

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit **$ 690** *to complete the basic filing fee and/or file a small entity statement claiming such status (37 CFR 1.27).*
- Total additional claim fee(s) for this application is $1206.
  - **$972** for **54** total claims over 20.
  - **$234** for **3** independent claims over 3 .
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 2026.**

A copy of this notice MUST be returned with the reply.

Ruth Sydna

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART 3 - OFFICE COPY

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W. BRIAN EDGE*

KAREN R. MARKOWICZ**
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ANDREA J. KAMAGE**
NANCY J. LEITH**
TARJA H. NAUKKARINEN**

*BAR OTHER THAN D.C.
**REGISTERED PATENT AGENTS

August 7, 2000



WRITER'S DIRECT NUMBER:
(202) 371-2674
INTERNET ADDRESS:
mlee@skgf.com

Commissioner for Patents
Washington, D.C. 20231

Box Missing Parts

Re: U.S. Non-Provisional Utility Patent Application
Appl. No. 09/521,879; Filed: March 9, 2000
For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**
Inventors: Sorrells *et al.*
Our Ref: 1744.0010003

Sir:

In reply to the "Notice to File Missing Parts of Application--Filing Date Granted," dated May 18, 2000, Applicants submit the following documents for appropriate action by the U.S. Patent and Trademark Office:

1. Petition for Extension of Time under 37 C.F.R. § 1.136 (*in duplicate*);
2. PTO Fee Transmittal Form PTO/SB/17 (*in duplicate*);
3. Preliminary Amendment;
4. Copy of the Notice to File Missing Parts;
5. Original, executed Combined Declaration and Power of Attorney;
6. Original, executed Power of Attorney from Assignee;

7. Original, executed Certificate under 37 C.F.R. § 3.73(b) with a copy of Assignment attached;

8. Our Check No. 28310 for $ 930.00 to cover:

   $ 690.00 Filing Fee for Patent Application (37 C.F.R. § 1.16),
   $ 130.00 Surcharge for late filing of Declaration (37 C.F.R. § 1.16), and
   $ 110.00 For extension of time fees under 37 C.F.R. § 1.136; and

9. One return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036. If extensions of time under 37 C.F.R. § 1.136 other than those otherwise provided for herewith are required to prevent abandonment of the present patent application, then such extensions of time are hereby petitioned, and any fees therefor are hereby authorized to be charged to our Deposit Account No. 19-0036. A duplicate copy of this letter is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

MQL/VLB/sjc
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SKGF Rev. 4/27/00

secetor

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ANDREA J. KAMAGE**
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TARJA H. NAUKKARINEN**

*BAR OTHER THAN D.C.
**REGISTERED PATENT AGENTS

August 7, 2000

WRITER'S DIRECT NUMBER:
(202) 371-2674
INTERNET ADDRESS:
mlee@skgf.com



Commissioner for Patents
Washington, D.C. 20231

Box Missing Parts

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Appl. No. 09/521,879; Filed: March 9, 2000
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Inventors: Sorrells *et al.*
Our Ref: 1744.0010003

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3. Preliminary Amendment;
4. Copy of the Notice to File Missing Parts;
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6. Original, executed Power of Attorney from Assignee;

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Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

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SKGF Rev. 4/27/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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AUG 07 2000
PATENT & TRADEMARK OFFICE
JC550

DUPLICATE

In re application of:
Sorrells *et al.*
Appl. No. 09/521,879
Filed: March 9, 2000
For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**

Art Unit: (*to be assigned*)
Examiner: (*to be assigned*)
Atty. Docket: 1744.0010003

Petition For Extension of Time Under 37 C.F.R. § 1.136(a)(1)

Commissioner for Patents
Washington, D.C. 20231

Sir:

It is hereby requested that the period for replying to the outstanding Notice to File Missing Parts be extended one month from July 18, 2000 to August 18, 2000 by the filing of this Petition and fee payment.

The petition fee (37 C.F.R. § 1.17(a)) is believed to be $110.00 for a one-month extension for a large entity. Fee payment is provided in our accompanying Check No. 28310. However, if extensions of time under 37 C.F.R. § 1.136 other than those provided herewith are required to prevent abandonment of the present patent application, then such extensions of time are hereby petitioned.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036. A duplicate copy of this Petition is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Date: 8/7/00

1100 New York Avenue, N.W., Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

P:\USERS\VBEASTON\1744.0010003\NTFMP.EOT SKGF Rev. 4/27/00 mac

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE #6



In re application of:
Sorrells *et al.*
Appl. No. 09/521,879
Filed: March 9, 2000
For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**

Art Unit: (*to be assigned*)
Examiner: (*to be assigned*)
Atty. Docket: 1744.0010003

Petition For Extension of Time Under 37 C.F.R. § 1.136(a)(1)

Commissioner for Patents
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Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

08/09/2000 AGOITOM 00000045 09521879
03 FC:115 110.00 OP

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Date: 8/7/00

1100 New York Avenue, N.W., Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

P:\USERS\VBEASTON\1744.0010003\NTFMP.EOT SKGF Rev. 4/27/00 mac

PTO/SB/17 (12/99)

Approved for use through 09/30/2000. OMB 0651-0032

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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OIPE
AUG 07 2000
PATENT & TRADEMARK OFFICE
JC956

DUPLICATE

FEE TRANSMITTAL
for FY 2000

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/...
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT	($) 930.00

Complete if known

Application Number	09/521,...
Filing Date	March 9, 2000
First Named Inventor	David F. Sorrells
Examiner Name	(to be assigned)
Group / Art Unit	(to be assigned)
Attorney Docket Number	1744.0010003

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayment to:

Deposit Account Number	19-0036
Deposit Account Name	Sterne, Kessler, Goldstein & Fox P.L.L.C.

☐ Charge Any Additional Fee Required Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed: ☒ Check ☐ Money Order ☒ Other*
*Charge any deficiencies or credit any overpayments in the fees or fee calculations of Parts 1, 2 and 3 below to Deposit Account No. 19-0036.

FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
101	690	201	345	Utility filing fee	$690.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	334	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 690.00

2. EXTRA CLAIM FEES

		Extra	Fee from below		Fee Paid
Total Claims	1 - 20** =	0 X	$18.00	=	$0.00
Indep Claims	1 - 3** =	0 X	$78.00	=	$0.00
Multiple Dependent				=	

** or number previously paid, if greater; For Reissues, see below

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim
108	78	209	39	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0.00

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Fee Code	Entity Fee ($)	Small Fee Code	Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	$130.00
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	110.00
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	690	246	345	Filing a submission after final rejection (37 CFR 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) :

Other fee (specify) :

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 240.00

SUBMITTED BY				Complete (if applicable)	
Typed or Printed Name	Michael Q. Lee			Reg. Number	35,239
Signature		Date	8/7/00	Deposit Acct. User ID	

WARNING:
Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

SKGF Rev. 5/11/00 mac

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PTO/SB/17 (12/99)
Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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FEE TRANSMITTAL
for FY 2000

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.



TOTAL AMOUNT OF PAYMENT	($) 930.00

Complete if Known	
Application Number	09/521,879
Filing Date	March 9, 2000
First Named Inventor	David F. Sorrells
Examiner Name	(to be assigned)
Group / Art Unit	(to be assigned)
Attorney Docket Number	1744.0010003

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1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayment to:

Deposit Account Number: 19-0036
Deposit Account Name: Sterne, Kessler, Goldstein & Fox P.L.L.C.

☐ Charge Any Additional Fee Required Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed: ☒ Check ☐ Money Order ☒ Other*
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SUBTOTAL (1) ($) 690.00

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		Extra	Fee from below		Fee Paid
Total Claims	1 - 20** =	0	X $18.00	=	$0.00
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FEE CALCULATION (continued)

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149	690	249	345	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) :
Other fee (specify) :
*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 240.00

SUBMITTED BY				Complete (if applicable)	
Typed or Printed Name	Michael D. Lee			Reg. Number	35,239
Signature		Date	8/7/00	Deposit Acct. User ID	

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SKGF Rev. 5/11/00 mac

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OIPE JC569 AUG 07 2000 PATENT & TRADEMARK OFFICE

In re application of:
Sorrells *et al.*
Appl. No. 09/521,879
Filed: March 9, 2000
For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**

Art Unit: (*to be assigned*)
Examiner: (*to be assigned*)
Atty. Docket: 1744.0010003

Preliminary Amendment

Commissioner for Patents
Washington, DC 20231

Sir:

Prior to examination of the captioned application, please enter the following Amendment.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those which may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, then such extensions of time are hereby petitioned under 37 CFR § 1.136(a), and any fees required therefor (including fees for net addition of claims) are hereby authorized to be charged to Deposit Account No. 19-0036.

Amendment

Please cancel claims 2-74 without prejudice to or disclaimer of the subject matter therein.

Please amend claim 1 as follows:

1. (Once Amended) A method for down-converting an electromagnetic signal, comprising the steps of:

(1) performing a matched filtering/correlating operation on a portion of a carrier signal, where $S_0(t)$ is an output of the matched filtering/correlating operation, k is a constant, $S_i(t)$ is an approximate half cycle of the carrier signal, and t_0-0 is a predetermined time interval, and wherein step (1) comprises the step of processing an approximate half cycle of the carrier signal in accordance with:

$$S_0(t) = k\int_0^{t_0} S_i^2(t)dt \text{ ; and}$$

(2) accumulating the result of the matched filtering/correlating operation of step (1), [; and

(3) repeating steps (1) and (2) for additional portions of the carrier signal, whereby the accumulation results form a down-converted signal.]

Remarks

Claim 1, as amended, is pending in the above-captioned application. Claim 1 is sought to be amended. Claims 2-74 are sought to be canceled without prejudice or disclaimer of the matter therein. These changes are not believed to include any new matter, and their entry is respectfully solicited.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Date: 8/7/2000

1100 New York Avenue, #600
Washington, D.C. 20005-3934
(202) 371-2600

P96-76.WPD

#3

FORMALITIES LETTER

OC000000005125682

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENT AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/521,879	03/09/2000	David F. Sorrells	1744.0010003

Sterne Kessler Goldstein & Fox PLLC
1100 New York Avenue NW
Suite 600
Washington, DC 20005-3934

OIPE JC56 AUG 07 2000 PATENT & TRADEMARK OFFICE

Date Mailed: 05/18/2000

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit **$ 690** *to complete the basic filing fee and/or file a small entity statement claiming such status (37 CFR 1.27).*
- Total additional claim fee(s) for this application is $1206.
  - **$972** for **54** total claims over 20.
  - **$234** for **3** independent claims over 3 .
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 2026.**

A copy of this notice MUST be returned with the reply.

Ruth Sydnor

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE

03/09/2000 ABDITOM 00000045 09521879
01 FC:101 690.00 DP
02 FC:105 130.00 DP

OIPE JC56 AUG 07 2000 PATENT AND TRADEMARK OFFICE

#5

Combined Declaration and Power of Attorney for Patent Application

Docket Number: 1744.0010003

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed and for which a patent is sought on the invention entitled **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**, the specification of which is attached hereto unless the following box is checked:

■ was filed on March 9, 2000 ;
as United States Application Number or PCT International Application Number 09/521,879 ; and
was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information that is material to patentability as defined in 37 C.F.R. § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application, which designated at least one country other than the United States listed below, and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Claimed
_____ (Application No.)	_____ (Country)	_____ (Day/Month/Year Filed)	□ Yes □ No
_____ (Application No.)	_____ (Country)	_____ (Day/Month/Year Filed)	□ Yes □ No

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

_____ (Application No.)	_____ (Filing Date)
_____ (Application No.)	_____ (Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or under § 365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information that is material to patentability as defined in 37 C.F.R. § 1.56 that became available between the filing date of the prior application and the national or PCT international filing date of this application.

09/176,022 (Application No.)	October 21, 1998 (Filing Date)	patented (Status - patented, pending, abandoned)
09/293,342 (Application No.)	April 16, 1999 (Filing Date)	pending (Status - patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Robert G. Sterne, Esq., Reg. No. 28,912; Edward J. Kessler, Esq., Reg. No. 25,688; Jorge A. Goldstein, Esq., Reg. No. 29,021; Samuel L. Fox, Esq., Reg. No. 30,353; David K.S. Cornwell, Esq., Reg. No. 31,944; Robert W. Esmond, Esq., Reg. No. 32,893; Tracy-Gene G. Durkin, Esq., Reg. No. 32,831; Michele A. Cimbala, Esq., Reg. No. 33,851; Michael B. Ray, Esq., Reg. No. 33,997; Robert E. Sokohl, Esq., Reg. No. 36,013; Eric K. Steffe, Esq., Reg.No. 36,688; Michael Q. Lee, Esq., Reg. No. 35,239; Steven R. Ludwig, Esq., Reg. No. 36,203; Raz E. Fleshner, Esq., Reg. No. 34,331; John M. Covert, Esq., Reg. No. 38,759; and Linda E. Alcorn, Esq., Reg. No. 39,588.

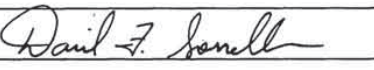
Send Correspondence to:

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934

Direct Telephone Calls to:

(202) 371-2600

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first inventor David F. SORRELLS
Signature of first inventor  Date 07/13/00
Residence Jacksonville, Florida
Citizenship U.S.A.
Post Office Address 5250 Siesta Rio Drive South, Jacksonville, Florida 32258
Full name of second inventor Michael J. BULTMAN
Signature of second inventor  13 JUL 00 Date
Residence Jacksonville, Florida
Citizenship U.S.A.
Post Office Address 2244 Aztec Drive West, Jacksonville, Florida 32246

Full name of third inventor Robert W. COOK	
Signature of third inventor	7/13/00 Date
Residence Switzerland, Florida	
Citizenship U.S.A.	
Post Office Address 1432 Roberts Road, Switzerland, Florida 32259	

Full name of fourth inventor Richard C. LOOKE	
Signature of fourth inventor	7/13/00 Date
Residence Jacksonville, Florida	
Citizenship U.S.A.	
Post Office Address 3170 Ricky Drive, Jacksonville, Florida 32223	

Full name of fifth inventor Charley D. MOSES, Jr.	
Signature of fifth inventor	07-13-00 Date
Residence Jacksonville, Florida	
Citizenship U.S.A.	
Post Office Address 4314 Naranja Drive, Jacksonville, Florida 32217	

Full name of sixth inventor Michael W. RAWLINS
Signature of sixth inventor Date 7/12/00
Residence Lake Mary, Florida
Citizenship U.S.A.
Post Office Address 665 Brightview Drive, Lake Mary, Florida 32746
Full name of seventh inventor Gregory S. RAWLINS
Signature of seventh inventor Date 7/12/00
Residence Lake Mary, Florida
Citizenship U.S.A.
Post Office Address 299 Leslie Lane, Lake Mary, Florida 32746

P:\USER\VBEASTON\1744.0010003\DECLARATION

(Supply similar information and signature for subsequent joint inventors, if any)

POWER OF ATTORNEY FROM ASSIGNEE



ParkerVision, Inc., a corporation of Florida, having a principal place of business at 8493 Baymeadows Way, Jacksonville, Florida 32256, is assignee of the entire right, title and interest for the United States of America (as defined in 35 U.S.C. § 100), by reason of an Assignment to the Assignee executed on (1) 7-13-00, (2) 7-13-00, (3) 7-13-00, (4) 7-13-00, (5) 7-13-00, (6) 7-13-00, and (7) 7-13-00, of an invention known as **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus** (Attorney Docket No. 1744.0010003), which is disclosed and claimed in a patent application of the same title by the inventors (1) David F. Sorrells, (2) Michael J. Bultman, (3) Robert W. Cook, (4) Richard C. Looke, (5) Charley D. Moses, Jr., (6) Gregory S. Rawlins, and (7) Michael W. Rawlins (said application filed on March 9, 2000 at the U.S. Patent and Trademark Office, having Application Number 09/521,879).

The Assignee hereby appoints the following U.S. attorneys to prosecute this application and any continuation, divisional, continuation-in-part, or reissue application thereof, and to transact all business in the U.S. Patent and Trademark Office connected therewith: Robert Greene Sterne, Esq., Reg. No. 28,912; Edward J. Kessler, Esq., Reg. No. 25,688; Jorge A. Goldstein, Esq., Reg. No. 29,021; Samuel L. Fox, Esq., Reg. No. 30,353; David K.S. Cornwell, Esq., Reg. No. 31,944; Robert W. Esmond, Esq., Reg. No. 32,893; Tracy-Gene G. Durkin, Esq., Reg. No. 32,831; Michele A. Cimbala, Esq., Reg. No. 33,851; Michael B. Ray, Esq., Reg. No. 33,997; Robert E. Sokohl, Esq., Reg. No. 36,013; Eric K. Steffe, Esq., Reg. No. 36,688, Michael Q. Lee, Esq., Reg. No. 35,239; Steven R. Ludwig, Esq., Reg. No. 36,203; Raz E. Fleshner, Esq., Reg. No. 34,331; John M. Covert, Esq., Reg. No. 38,759; and Linda E. Alcorn, Esq., Reg. No. 39,588. The Assignee hereby grants said attorneys the power to insert on this Power of Attorney any further identification that may be necessary or desirable in order to comply with the rules of the U.S. Patent and Trademark Office.

Send correspondence to:

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
U.S.A.

Direct phone calls to 202-371-2600.

FOR: ParkerVision, Inc.

SIGNATURE: _____

BY: Jeffrey L. Parker

TITLE: Chairman and Chief Executive Officer

DATE: 7-13-00

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PATENT & TRADEMARK OFFICE
JC599

Certificate Under 37 C.F.R. § 3.73(b)

Applicants/Patent Owner: Sorrells *et al.*

Application No./Patent No.: 09/521,879 Filed/Issue Date: March 9, 2000

Entitled: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**

ParkerVision, Inc. (Name of Assignee), a Florida corporation (Type of Assignee, e.g., corporation, partnership, university, government agency,etc.),

states that it is:

1. [X] the assignee of the entire right, title, and interest, or

2. [ ] an assignee of an undivided part interest

in the patent application/patent identified above by virtue of either:

A. [X] An Assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the Patent and Trademark Office at Reel _____, Frame ____, or for which a copy thereof is attached.

OR

B. [ ] A chain of title from the inventor(s) of the patent application/patent identified above to the current assignee as shown below:

1. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

[ ] Additional documents in the chain of title are listed on a supplemental sheet.

[X] Copies of assignments or other documents in the chain of title are attached.

[**NOTE:** A separate copy (*i.e.*, the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the PTO. See MPEP 302-302.8]

The undersigned ~~(whose title~~ is supplied below) is empowered to act on behalf of the assignee.

Date: 7-13-00

Name: Jeffrey L. Parker

Title: Chairman and Chief Executive Officer

Signature:

P:\USERS\VBEASTON\1744.0010003\373.CERTIFICATE
SKGF Rev.3/31/00 mac

ASSIGNMENT

In consideration of the sum of One Dollar ($1.00) or equivalent and other good and valuable consideration paid to each of the undersigned inventor(s): (1) David F. Sorrells, (2) Michael J. Bultman, (3) Robert W. Cook, (4) Richard C. Looke, (5) Charley D. Moses, Jr., (6) Gregory S. Rawlins, and (7) Michael W. Rawlins, the undersigned inventor(s) hereby sell(s) and assign(s) to ParkerVision, Inc. (the Assignee) his/her entire right, title and interest, including the right to sue for past infringement and to collect for all past, present and future damages:

"WORK COPY" "NOT FOR RECORDATION"

check applicable box(es) ☒ for the United States of America (as defined in 35 U.S.C. § 100),
☒ and throughout the world,

(a) in the invention(s) known as **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus** for which application(s) for patent in the United States of America has (have) been executed by the undersigned on (1) 7-13-00 (2) 7-13-00 (3) 7-13-00; (4) 7-13-00; (5) 7-13-00; (6) 7-12-00 and (7) 7-12-00; (also known as United States Application No. 09/521,879, filed March 9, 2000, in any and all applications thereon, in any and all Letters Patent(s) therefor, and

(b) in any and all applications that claim the benefit of the patent application listed above in part (a), including continuing applications, reissues, extensions, renewals and reexaminations of the patent application or Letters Patent therefor listed above in part (a), to the full extent of the term or terms for which Letters Patents issue, and

(c) in any and all inventions described in the patent application listed above in part (a), and in any and all forms of intellectual and industrial property protection derivable from such patent application, and that are derivable from any and all continuing applications, reissues, extensions, renewals and reexaminations of such patent application, including, without limitation, patents, applications, utility models, inventor's certificates, and designs together with the right to file applications therefor, and including the right to claim the same priority rights from any previously filed applications under the International Agreement for the Protection of Industrial Property, or any other international agreement, or the domestic laws of the country in which any such application is filed, as may be applicable;

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all such rights, title and interest to be held and enjoyed by the above-named Assignee, its successors, legal representatives and assigns to the same extent as all such rights, title and interest would have been held and enjoyed by the Assignor had this assignment and sale not been made.

The undersigned inventor(s) agree(s) to execute all papers necessary in connection with the application(s) and any continuing (continuation, divisional, or continuation-in-part), reissue, reexamination or corresponding application(s) thereof and also to execute separate assignments in connection with such application(s) as the Assignee may deem necessary or expedient.

The undersigned inventor(s) agree(s) to execute all papers necessary in connection with any interference or patent enforcement action (judicial or otherwise) related to the application(s) or any continuing (continuation, divisional, or continuation-in-part), reissue or reexamination application(s) thereof and to cooperate with the Assignee in every way possible in obtaining evidence and going forward with such interference or patent enforcement action.

The undersigned inventor(s) hereby represent(s) that he/she has full right to convey the entire interest herein assigned, and that he/she has not executed, and will not execute, any agreement in conflict therewith.

"WORK COPY" "NOT FOR RECORDATION"

The undersigned inventor(s) hereby grant(s) Robert Greene Sterne, Esquire, Registration No. 28,912; Edward J. Kessler, Esquire, Registration No. 25,688; Jorge A. Goldstein, Esquire, Registration No. 29,021; Samuel L. Fox, Esquire, Registration No. 30,353; David K.S. Cornwell, Esquire, Registration No. 31,944; Robert W. Esmond, Esquire, Registration No. 32,893; Tracy-Gene G. Durkin, Esquire, Registration No. 32,831; Michele A. Cimbala, Esquire, Registration No. 33,851; Michael B. Ray, Esquire, Registration No. 33,997; Robert E. Sokohl, Esquire, Registration No. 36,013; Eric K. Steffe, Esquire, Registration No. 36,688; Michael Q. Lee, Esquire, Registration No. 35,239; Steven R. Ludwig, Esquire, Registration No. 36,203; Raz E. Fleshner, Esquire, Registration No. 34,331; John M. Covert, Esquire, Registration No. 38,759; and Linda E. Alcorn, Esquire, Registration No. 39,588; all of STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C., 1100 New York Avenue, N.W., Suite 600, Washington, D.C. 20005-3934, power to insert in this assignment any further identification that may be necessary or desirable in order to comply with the rules of the United States Patent and Trademark Office for recordation of this document.

COPY "NOT FOR RECORDATION"

IN WITNESS WHEREOF, executed by the undersigned on the date(s) opposite their name(s).

Date: 07/13/00 Signature of Inventor: _____
David F. Sorrells

Date: 13 Jul 00 Signature of Inventor: _____
Michael J. Bultman

Date: 7/13/00 Signature of Inventor: _____
Robert W. Cook

COPY "NOT FOR RECORDATION"

Date: 7/13/01 Signature of Inventor: _____
Richard C. Looke

Date: 07/13/00 Signature of Inventor: _____
Charley D. Moses, Jr.

Date: _____ Signature of Inventor: _____
Gregory S. Rawlins

Date: _____ Signature of Inventor: _____
Michael W. Rawlins

P:\USERS\VBEASTON\1744.0010003\ASSIGNMENT

COPY "NOT FOR RECORDATION"

The undersigned inventor(s) hereby grant(s) Robert Greene Sterne, Esquire, Registration No. 28,912; Edward J. Kessler, Esquire, Registration No. 25,688; Jorge A. Goldstein, Esquire, Registration No. 29,021; Samuel L. Fox, Esquire, Registration No. 30,353; David K.S. Cornwell, Esquire, Registration No. 31,944; Robert W. Esmond, Esquire, Registration No. 32,893; Tracy-Gene G. Durkin, Esquire, Registration No. 32,831; Michele A. Cimbala, Esquire, Registration No. 33,851; Michael B. Ray, Esquire, Registration No. 33,997; Robert E. Sokohl, Esquire, Registration No. 36,013; Eric K. Steffe, Esquire, Registration No. 36,688; Michael Q. Lee, Esquire, Registration No. 35,239; Steven R. Ludwig, Esquire, Registration No. 36,203; Raz E. Fleshner, Esquire, Registration No. 34,331; John M. Covert, Esquire, Registration No. 38,759; and Linda E. Alcorn, Esquire, Registration No. 39,588; all of STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C., 1100 New York Avenue, N.W., Suite 600, Washington, D.C. 20005-3934, power to insert in this assignment any further identification that may be necessary or desirable in order to comply with the rules of the United States Patent and Trademark Office for recordation of this document.

IN WITNESS WHEREOF, executed by the undersigned on the date(s) opposite their name(s).

Date: _____ Signature of Inventor: _____
David F. Sorrells

Date: _____ Signature of Inventor: _____
Michael J. Bultman

Date: _____ Signature of Inventor: _____
Robert W. Cook

Date: _____ Signature of Inventor: _____
Richard C. Looke

Date: _____ Signature of Inventor: _____
Charley D. Moses, Jr.

Date: 7/12/00 Signature of Inventor: _____
Gregory S. Rawlins

Date: 7/12/00 Signature of Inventor: _____
Michael W. Rawlins

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STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
ATTORNEYS AT LAW
1100 NEW YORK AVENUE, N.W. • WASHINGTON, D.C. 20005-3934
PHONE: (202) 371-2600 • FACSIMILE: (202) 371-2540 • www.skgf.com

#7

ROBERT GREENE STERNE
EDWARD J. KESSLER
JORGE A. GOLDSTEIN
SAMUEL L. FOX***
DAVID K.S. CORNWELL
ROBERT W. ESMOND
TRACY-GENE G. DURKIN
MICHELE A. CIMBALA
MICHAEL B. RAY
ROBERT E. SOKOHL
ERIC K. STEFFE
MICHAEL O. LEE
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ANDREA J. KAMAGE**
NANCY J. LEITH**
ELIZABETH J. HAANES**
MARK P. TERRY**

*BAR OTHER THAN D.C.
**REGISTERED PATENT AGENT
***SENIOR COUNSEL

March 21, 2001

WRITER'S DIRECT NUMBER:
(202) 371-2674
INTERNET ADDRESS:
mlee@skgf.com

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MAR 23 2001
Technology Center 2600

Commissioner for Patents
Washington, D.C. 20231

Art Unit 2649

Re: U.S. Non-Provisional Utility Patent Application
Appl. No. 09/521,879; Filed: March 9, 2000
For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**
Inventors: Sorrells *et al.*
Our Ref: 1744.0010003

Sir:

Transmitted herewith for appropriate action are the following documents:

1. Letter of Express Abandonment; and

2. One return postcard.

It is respectfully requested that the attached postcard be stamped with the date of filing of these documents, and that it be returned to our courier. In the event that extensions of time are necessary to prevent abandonment of this patent application, then such extensions of time are hereby petitioned.

OIPE JC68 MAR 21 2001 PATENT & TRADEMARK OFFICE

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 19-0036. A duplicate copy of this letter is enclosed.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Enclosures

MQL/VLB/sjc
P:\USERS\VBEASTON\1744.0010003\Exp.abn.CVR
SKGF Rev. 4/27/00 mac

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Technology Center 2600

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ATTORNEYS AT LAW
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PHONE: (202) 371-2600 • FACSIMILE: (202) 371-2540 • www.skgf.com

DUPLICATE

ROBERT GREENE STERNE
EDWARD J. KESSLER
JORGE A. GOLDSTEIN
SAMUEL L. FOX***
DAVID K.S. CORNWELL
ROBERT W. ESMOND
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***SENIOR COUNSEL

March 21, 2001

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Washington, D.C. 20231

Art Unit 2649

Re: U.S. Non-Provisional Utility Patent Application
Appl. No. 09/521,879; Filed: March 9, 2000
For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**
Inventors: Sorrells *et al.*
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1. Letter of Express Abandonment; and

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Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Enclosures

MQL/VLB/sjc
P:\USERS\VBEASTON\1744.0010003\Exp.abn.CVR
SKGF Rev. 4/27/00 mac

OIPE JC68 MAR 21 2001 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Sorrells *et al.*

Appl. No. 09/521,879

Filed: March 9, 2000

For: **Matched Filter Characterization and Implementation of Universal Frequency Translation Method and Apparatus**

Art Unit: 2649

Examiner: (*to be assigned*)

Atty. Docket: 1744.0010003

Letter of Express Abandonment

Commissioner for Patents
Washington, D.C. 20231

Sir:

Applicants hereby expressly abandon the above-referenced patent application, but not any invention described and/or claimed therein.

It is to be understood that although Applicants are abandoning the present application, no express or implied admission or compliance is made by this express abandonment, with respect to any objections or rejections made by an Examiner.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

Michael Q. Lee
Attorney for Applicants
Registration No. 35,239

Date: 3/21/2001

1100 New York Avenue, N.W.
Suite 600
Washington, D.C. 20005-3934
(202) 371-2600

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UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/521,879	03/09/2000	David F. Sorrells	1744.0010003	2561

7590 12/17/2003

Sterne Kessler Goldstein & Fox PLLC
1100 New York Avenue NW
Suite 600
Washington, DC 20005-3934

EXAMINER	
ODOM, CURTIS B	

ART UNIT	PAPER NUMBER
2634	8

DATE MAILED: 12/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Notice of Abandonment	Application No.	Applicant(s)	
	09/521,879	SORRELLS ET AL.	
	Examiner	Art Unit	
	Curtis B. Odom	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☐ Applicant's failure to timely file a proper reply to the Office letter mailed on _____.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
   (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.
   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
   (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
   (d) ☐ No reply has been received.

2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.
   The issue fee required by 37 CFR 1.18 is $_____. The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☐ The issue fee and publication fee, if applicable, has not been received.

3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawings have been received.

4. ☒ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.

6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☐ The reason(s) below:

STEPHEN CHIN
SUPERVISORY PATENT EXAMINE
TECHNOLOGY CENTER 2600

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

Transaction History Date 2008-08-20
Date information retrieved from USPTO Patent Application Information Retrieval (PAIR) system records at www.uspto.gov

PTO/SB/68 (09-06)
Approved for use through 3/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR ACCESS TO AN ABANDONED APPLICATION UNDER 37 CFR 1.14

Bring completed form to:
File Information Unit, Room 2E04
2900 Crystal Drive
Arlington, VA 22202-3514

Telephone: (703) 308-2733

In re Application of: Sorvells

Application Number	Filed
09/521,879	mar. 9, 00

Paper No. 09

I hereby request access under 37 CFR 1.14(a)(1)(iv) to the application file record of the above-identified ABANDONED application, which is not within the file jacket of a pending Continued Prosecution Application (CPA) (37 CFR 1.53(d)) and which is identified in, or to which a benefit is claimed, in the following document (as shown in the attachment):

United States Patent Application Publication No. _____, page, _____ line _____,

United States Patent Number 6813,485, column _____, line, _____ or

WIPO Pub. No. _____, page _____, line _____.

AUG 20 2008

Related Information About Access to Applications Maintained in the Image File Wrapper System (IFW) and Access to Pending Applications in General

A member of the public, acting without a power to inspect, cannot order applications maintained in the IFW system through the FIU. If the member of the public is entitled to a copy of the application file, then the file is made available through the Public Patent Application Information Retrieval system (Public PAIR) on the USPTO internet web site (www.uspto.gov). Terminals that allow access to Public PAIR are available in the Public Search Room. The member of the public may also be entitled to obtain a copy of all or part of the application file upon payment of the appropriate fee. Such copies must be purchased through the **Office of Public Records** upon payment of the appropriate fee (37 CFR 1.19(b)).

For **published** applications that are still pending, a member of the public may obtain a **copy** of: the file contents; the pending application as originally filed; or any document in the file of the pending application.

For **unpublished** applications that are still pending:

(1) If the benefit of the pending application is claimed under 35 U.S.C. 119(e), 120, 121, or 365 in another application that has: (a) issued as a U.S. patent, or (b) published as a statutory invention registration, a U.S. patent application publication, or an international patent application publication in accordance with PCT Article 21(2), a member of the public may obtain a **copy** of: the file contents; the pending application as originally filed; or any document in the file of the pending application.

(2) If the application is incorporated by reference or otherwise identified in a U.S. patent, a statutory invention registration, a U.S. patent application publication, or an international patent application publication in accordance with PCT Article 21(2), a member of the public may obtain **a copy** of the pending application as originally filed.

G. Wasserman
Signature

8-20-8
Date

GARY WASSERMAN
Typed or printed name

Registration Number, if applicable

(703) 931-4540
Telephone Number

FOR PTO USE ONLY

Approved by: _____ AUG 20 2008 (Initials)

Unit: _____

This collection of information is required by 37 CFR 1.11 and 1.14. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **BRING TO: File Information Unit, Room 2E04, 2900 Crystal Drive, Arlington, Virginia.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

US006813485B2

(12) **United States Patent**
Sorrells et al.

(10) **Patent No.: US 6,813,485 B2**
(45) **Date of Patent: Nov. 2, 2004**

#09

(54) **METHOD AND SYSTEM FOR DOWN-CONVERTING AND UP-CONVERTING AN ELECTROMAGNETIC SIGNAL, AND TRANSFORMS FOR SAME**

(75) Inventors: **David F. Sorrells**, Middleburg, FL (US); **Michael J. Bultman**, Jacksonville, FL (US); **Robert W. Cook**, Switzerland, FL (US); **Richard C. Looke**, Jacksonville, FL (US); **Charley D. Moses, Jr.**, Jacksonville, FL (US); **Gregory S. Rawlins**, Heathrow, FL (US); **Michael W. Rawlins**, Lake Mary, FL (US)

(73) Assignee: **ParkerVision, Inc.**, Jacksonville, FL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 619 days.

(21) Appl. No.: **09/838,387**

(22) Filed: **Apr. 20, 2001**

(65) **Prior Publication Data**

US 2002/0058490 A1 May 16, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/550,644, filed on Apr. 14, 2000, which is a continuation-in-part of application No. 09/521,879, filed on Mar. 9, 2000, now abandoned, which is a continuation-in-part of application No. 09/293,342, filed on Apr. 16, 1999, which is a continuation-in-part of application No. 09/176,022, filed on Oct. 21, 1998, now Pat. No. 6,061,551.

(60) Provisional application No. 60/199,141, filed on Apr. 24, 2000.

(51) **Int. Cl.**[7] **H04B 1/26**

(52) **U.S. Cl.** **455/313**; 455/118; 455/323

(58) **Field of Search** 455/313, 323, 455/131, 130, 76, 260, 191.1, 118, 91, 182.1, 112; 327/113, 100

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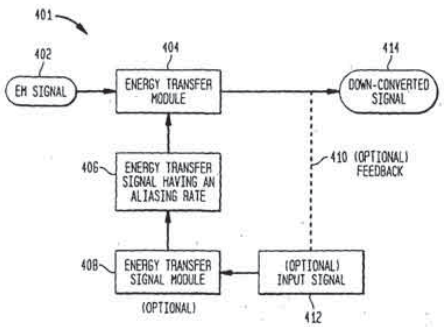
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(57) **ABSTRACT**

Methods, systems, and apparatuses, and combinations and sub-combinations thereof, for down-converting and up-converting an electromagnetic (EM) signal are described herein. Briefly stated, in embodiments the invention operates by receiving an EM signal and recursively operating on approximate half cycles (½, 1½, 2½, etc.) of the carrier signal. The recursive operations can be performed at a sub-harmonic rate of the carrier signal. The invention accumulates the results of the recursive operations and uses the accumulated results to form a down-converted signal. In an embodiment, the EM signal is down-converted to an intermediate frequency (IF) signal. In another embodiment, the EM signal is down-converted to a baseband information signal. In another embodiment, the EM signal is a frequency modulated (FM) signal, which is down-converted to a non-FM signal, such as a phase modulated (PM) signal or an amplitude modulated (AM) signal. Up-conversion is accomplished by controlling a switch with an oscillating signal, the frequency of the oscillating signal being selected as a sub-harmonic of the desired output frequency.

25 Claims, 139 Drawing Sheets



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Effective December 29, 1999

Application or Docket Number: 09/521809

CLAIMS AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	74 minus 20=	* 54
INDEPENDENT CLAIMS	6 minus 3 =	* 3
MULTIPLE DEPENDENT CLAIM PRESENT		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐ RATE	FEE	OR	OTHER THAN SMALL ENTITY RATE	FEE
	345.00	OR		690.00
X$ 9=		OR	X$18=	972
X39=		OR	X78=	234
+130=		OR	+260=	2
TOTAL		OR	TOTAL	1896

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X39=		OR	X78=	
+130=		OR	+260=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
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