(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 February 2014 (13.02.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/024201 A1

(51) International Patent Classification:
A61H 23/02 (2006.01) *A61N 7/00* (2006.01)
A61M 37/00 (2006.01)

(21) International Application Number:
PCT/IN2012/000642

(22) International Filing Date:
26 September 2012 (26.09.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2251/MUM/2012 6 August 2012 (06.08.2012) IN

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

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(54) **Title**: REGULATE AND MANAGE BLOOD GLUCOSE LEVELS OF A SUBJECT BY PROMOTING CELL METABOLISM WITH THE APPLICATION OF LOW FREQUENCY (20 KHZ TO 70 KHZ) AIRBORNE ULTRASOUND WAVES AND A MACHINE TO PRODUCE THE AIRBORNE ULTRASOUND WAVES THEREFOR

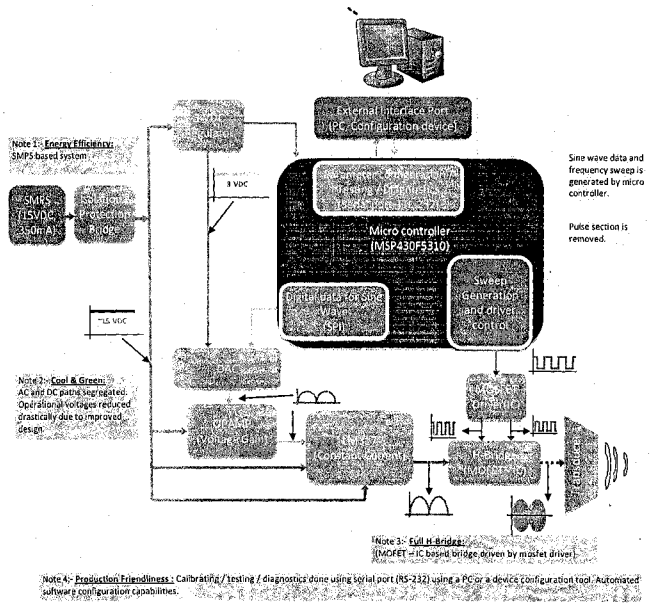


Fig - 1A

(57) **Abstract**: A digital aerostimulator or airborne ultrasound wave emitter comprising an Input Bridge Section for supply of unregulated full wave (V dc) to a voltage regulator, op-amp and sine wave generator. A Microcontroller Power Section comprising a voltage regulator UA78M33 and capacitors for signal filtering and a LED for status indication wherein the output from input bridge V dc goes as input to UA78M33. Further it comprises a Microcontroller Section centered around a microcontroller MSP430F2121IDW and a DAC (digital to analog converter) for full wave sine generation which is operationally coupled to the microcontroller. The Microcontroller section updates DAC with values stored in its look-up table to form a full sine wave at its output. Further the device comprises an OP-AMP voltage amplification stage and a regulated AC-current amplification stage, an Output Driver section, a MosFET H-Bridge section and an ultrasound transducer.

Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*

REGULATE AND MANAGE BLOOD GLUCOSE LEVELS OF A SUBJECT BY PROMOTING CELL METABOLISM WITH THE APPLICATION OF LOW FREQUENCY (20 KHZ TO 70 KHZ) AIRBORNE ULTRASOUND WAVES AND A MACHINE TO PRODUCE THE AIRBORNE ULTRASOUND WAVES THEREFOR

FIELD OF THE INVENTION:

The present invention relates generally to the application of low frequency airborne ultrasound waves (20 Khz to 70 Khz) with the help of a aerostimulator particularly a non-invasive personal aerostimulator to regulate / manage blood glucose levels / promote cell metabolism of a subject throughout the day.

BACKGROUND OF THE INVENTION:

Ultrasound which is routinely used for diagnostic imaging applications worldwide is now being adopted in various fields of drug delivery systems and other therapeutic use. Interactions of acoustic ultrasound with biological tissues play an important role in biomedical applications of ultrasound. Low intensity ultrasound is known to permeate the skin, modulate the cell membrane and alter its properties possibly activating signal transduction pathways. The energy absorbed by the enzymes from the ultrasound effects the overall function of the cell. This could lead to the increased production of protein or reduce the depletion of beta cells associated with insulin.

Utilizing the above knowledge a revolutionary product conceived with the sole purpose of regulating the blood glucose levels of millions of Diabetics world over and benefits the society on the whole. GlybetaC-Digital uses the goodness of airborne ultrasonic energy to enhance the cell permeability and help in the transportation of drugs into them thereby increasing the effectiveness of existing drugs.

GlybetaC-Digital Aerostimulator uses the principle of transmitting low frequency airborne ultrasound non invasively on humans to promote cell metabolism. The vibratory motion causes energy propagation which brings about a series of cascading effects on the cell membrane. Low frequency ultrasound is capable of maximum penetration and its energy is absorbed by the tissues, nerves etc. This changes the rate of macromolecular synthesis and causes ultrastructural changes within the cells. Enhanced stimulation of the cells by airborne ultrasound allows the permeability of the cells to increase and helps transport of the drugs into them.

On passing through the tissue, the ultrasonic energy is absorbed at a rate proportional to the density of the tissue. Absorption of the ultrasound signal results in energy conversion to heat. While this heating effect is extremely small, some enzymes or chemical mediators mediate the activation of intracellular signaling and additional mechanical stimulation of the cell membranes occur too. Ultrasound serves to reestablish or normalize effective metabolic temperatures in areas or in regions where blood flow has been compromised; this effect, while subtle, may be biologically profound.

The differential energy absorption of ultrasound also gives rise to the phenomenon of acoustic streaming, or the movement of fluid. The acoustic streaming and the resultant pressure may mechanistically advance signal-transduction pathways, a process referred to as mechanotransduction. Thus, the introduction of an ultrasound signal stimulates a dynamic physical environment. The enhanced movement of the fluid increases the processes of nutrient delivery and waste removal i.e Endocytosis and Exocytosis in the cells. It is likely that the acoustic signal is recognized and is strongly influential in the biology of the cells.

Optimal ultrasound has the capability to open. holes in cell membranes like the transport proteins integrated into the cell membranes. These proteins are transported by diffusion or assisted by the concentration gradient across the cell. The drugs are absorbed inside the cells by a process akin to Endocytosis, wherein the ultrasound assisted drug is released or transported inside the cell by opening the cell membrane and releasing the drug inside. The drug delivery is maximized while cell viability is maintained. Cell membranes opened due to the above processes are closed immediately by the internal cellular patching process.

Traditional methods of drug delivery are often not suitable for large molecules, such as proteins and DNA, underscoring the need for improved drug delivery strategies. Ultrasound holds considerable clinical promise in this realm, experts say.

OBJECT OF THE INVENTION:

It is therefore an object of the invention to provide a method of regulating/managing blood glucose levels of a subject by promoting cell metabolism with the application of low frequency (20 Khz to 70 Khz) airborne ultrasound wave *throughout the day with the help of a non-invasive personal aerostimulator.*

Further object of the present invention will be clear from the following description of the invention.

Acoustic vibrations that are transmitted over 20 KHz frequency in air are called Airborne Ultrasound waves. Piezoelectric crystals are used for generating ultrasound waves. The crystals are deformed in response to high frequency signals applied to them in the form of electrical voltage and ultrasonic waves are generated.

GlyBetaC Aerostimulator uses state of the art quartz crystal technology to generate ultrasonic sound waves which gives a micromassage and thermal effect in tissues and produces mechanical stimulation of the receptors in the human body.

GlyBetac Aerostimulator has variable modulations with a wide frequency bandwidth to allow a variety of waveforms which ensure that the body tissues do not develop immunity to any specific frequency.

Principle of working:

GlyBetaC Aerostimulator uses the principle of transmitting low frequency airborne ultrasound non invasively on humans to promote cell metabolism. Glucose is an essential substrate for the metabolism of most cells. The vibratory motion of ultrasound causes energy propagation which brings about a series of cascading effects on the cell membrane. Low frequency ultrasound is capable of maximum penetration and its energy is absorbed by the tissues, nerves etc. This changes the rate of macromolecular synthesis and causes ultrastructural changes within the cells. Transmission of ultrasound waves produces a micromassage effect in tissues and enhances mechanical stimulation of the receptors in human body. Enhanced stimulation of the cells by airborne ultrasound allows the permeability of the cells to improve and helps transport of glucose into them.

On passing through the tissue, the ultrasonic energy is absorbed at a rate proportional to the density of the tissue. Absorption of the ultrasound signal results in energy conversion to heat. This heating effect is extremely small because of pulsed form of transmission.

Ultrasound have Thermal and non thermal effects on the tissues. Energy attenuated by tissues leads to thermal increase and this thermal energy allows Facilitated diffusion of glucose thereby helping the transport of glucose into cells.

Thus helps the action potential and insulin release.

It also helps in transport of glucose into the cell.

Thermal action of Ultrasound apart from helping transport of glucose into the cell also helps to reestablish or normalize effective metabolic temperature in the areas where blood flow has been compromised especially in the lower limbs. This effect, while subtle, may be biologically profound.

Non thermal effects of Ultrasound are Stable Cavitation and Acoustic streaming. These mechanisms cause movements and transfers of intracellular and extracellular ions. An increase in intercellular ion transfers leads to changes in membrane permeability which helps transportation of glucose into cell thereby helping to regulate blood glucose levels.

The thermal action and the non-thermal action of the ultrasound wave is explained in figs.10,11,12 and 13.

BRIEF DESCRIPTION OF THE DRAWINGS:

The invention will now be described with respect to the non-limiting figures in the accompanying drawings, in which

FIG. 1A shows the block diagram of the digital aero stimulator
FIG. 1B shows the different essential parts of the digital aero stimulator

FIG. 2 shows the Input bridge section of the digital aero stimulator

FIG. 3 shows the circuit diagram of microcontroller power section

FIG. 4 shows the details of micro controller section

FIG. 5. shows the DAC for wave generation

FIG. 6 shows the voltage gain opamp section

FIG. 7 shows the Regulated AC using LM317
FIG. 8 shows the ouput drive section of the digital aero stimulator,

FIG. 9 shows the MosFET H-Bridge Section

FIG.10 to 13 explain the thermal action and the non-thermal action of the ultrasound wave.

Like reference numerals refer to like parts throughout the several views of the drawings.

DETAIL DESCRIPTION OF THE INVENTION

Referring to FIGS. 1 through 9, there is shown the details of the digital aero stimulator.

GlyBetaC DIGITAL comprises of the following sections

1.Input Bridge Section
2.Microcontroller Power Section
3.Microcontroller Section
4.12– BIT DAC for full wave sine generation
5.OPAMP for Voltage Amplification
6.Regulated AC- Current Amplification Stage
7.Output Driver Section
8.MosFet H-Bridge Section
9.Transducer

The details of above sections are given in fig 1.

The bridge supplies unregulated full wave (V_dc) to-
1. Input of UA78M33 Voltage Regulator (fig. 3)
2. Input of TLE2141 OPAMP.
3. Input of LM317 Voltage Regulator here used for Sine wave Generation.

Microcontroller Power Section

1. Output from Input Bridge & Regulatio n section V_dc goes as input to UA78M33.
2. UA78M33 Provides regulated 3.3VDC for microcontroller section.
3. Cap C3, C4 are used as Filter Caps.
4. LED L2 Serves the purpose of Indication.

Microcontroller Section

This section is centered around Microcontroller MSP430F2121IDW (Texas Instrument)
1. Microcontroller Used is MSP430F5310.
2. Works on 3.3VDC.
3. All Capacitors are used as Decoupling caps for Micro.
4. PINs TEST, TDO, TDI, TMS, TCK, RST are used as JTAG pins to Program the firmware into microcontroller.
5. Y1 – is Crystal Oscillator which gives 16MHz Clock Frequency for Micro.
6. Caps C1 & C2 are used as Decoupling Caps for Crystal Oscillator supply.
7. S1 – Switch – for Reset Purpose.
8. JP2 – 8Pin Header for JTAG.
9. P2.5 – TEST – used as PPM_LED.
10. P4.0 – SCLK_DAC – Used to update DAC with full wave sine data.
11. P4.1 – Din_DAC – Used to update DAC with full wave sine data.
12. P4.2 – Not Used.
13. P4.3 – FS - DAC – Used to update DAC with full wave sine data.
14. P4. 4 – TX-TTL –Used to configure parameters.
15. P4. 5 – RX-TTL –Used to configure parameters.
16. P4.7 / P4.6 – FREQ_SWEEP1 – 20KHz To 60KHz Freq Sweep on this PIN.
17. P1.0 – 100Hz_Scan – Not Used.
18. P1.5 – Sweep_Driver_En – Used To enable / disable Driver UCC27425.
19. P1.6 – Switch_Set – Used to Set Dafault parameters on machine boot up.
20. P1.7 – PPM_LED – Used as PPM LED.
21. P2.0 – Switch – Not Used.

12– BIT DAC for full wave sine generation

1. The Microcontroller (section.1-3) updates DAC with values stored in its look-up table to form a full sine wave at its output.
2. 180 value of DAC code data make up the full sine wave.
   Wave=Vp*sin(angle)*256/(2*DAC_Ref_Vol)

OPAMP for Voltage Amplification
1. The opamp is configured as a non inverting single supply gain stage.
2. The Feedback resistor (R14) and Input resistance (R15) decide the gain of the opamp.

3. Hardware Gain after opamp = (1 + Rf/Ri) = 1+ 100k/6.8k = 15.706

Regulated AC- Current Amplification Stage

1. The output of the opamp section.1-5 is fed to the adjust pin of the LM317. (3 terminal voltage adjustable voltage regulator)
2. The LM317's ability to follow the Adjust pin at the output gives the full sine wave with the required current(~1.5A) .
3. This powers the H-Bridge Section as described in section.1-8.

Output Driver Section
1. Driver IC U5 (UCC27425P) drives Sweep signal from microcontroller.
2. CAPs C16, C6 & C7 are used as decoupling Capacitors for UCC27425P.
3. Zener Diodes – Z2 & Z3 are used voltage regulator for UCC27425.
4. Output from this driver corresponds to Vdriver (+12V).
5. Output from this section goes as gate drive for MosFet Section.

MosFet H-Bridge Section

1. H-Bridge Used here is ZXMHC3A01T8 (3Amp, 30V) (Zetex Make).
2. CAPs C5, C26 are used as Decoupling capacitors for H-Bridge.
3. Diodes D7 & D5 are used to cut down offset voltage.
4. Output section is powered with 100Hz full wave rectified labeled 20Vpp_AC_100Hz – Section.1-6 .
5. This gives a 100Hz modulated wave with 20 KHz – 60 KHz encompassed frequency sweep.

System Specifications:

GlybetaC-Digital Aerostimulator consists of a console with a Quartz crystal transducer fixed to it.

Specifications:

1.	Power Supply	230 Volts AC 50 Hz
2.	Frequency	Between 20Khz and 65 KHz
3.	Pulse Rate	< 25 Pulse/Min.
4.	Sound Pressure Output< 110 dB	
5.	Dimensions	225mm * 65mm * 115mm

6. Weight 1250gms.

Safety:

GlybetaC-Digital Aerostimulator is made as per the guidelines / safety standards laid down by

- American Conference of Governmental and Industrial Hygienists (ACGIH)
- International Commission on Non Ionizing Radiation Protection (ICNIRP)
- World Health Organization.
- Bureau of Radiation and Medical Devices, Canada and many others.

Test Reasults conducted on Gly BetaC using top of the Rion range Sound Level meters and 1/3 octave band real time analyzer SA-78(JAPAN) are reproduced in drawing sheet 1-5.

Instructions for safe use of GlyBetac Aerostimulator:

- On day 1: Take a fasting glucose test before you start using GlyBetac.
- Plug in the machine to a standard 230 V AC electrical outlet.
- Sit at a minimum distance of 4 feet and a maximum distance of 6 feet away from the machine for minimum of 10 minutes and maximum of 20 minutes. Use GlyBetac 20 minutes before or after taking food .You can continue to do your routine work like listening to music, watching television etc while sitting before the unit.
- On day 2: Check your fasting glucose levels. Observe the difference and accordingly use the medication.
- Make sure that the doors are closed.
- Repeat steps 1 to 5 for day 3 and check the Fasting Glucose levels again on day 3.
- You can use the GlyBetac any number of times per day with minimum gap of 4 hrs.

- Use GlybetaC-Digital regularly for a week. After one week you can use the machine twice a week or as desired by you.
- Never keep the machine in the electrical outlet after the use.
- Do not tamper with the machine as it may malfunction.

- You can not hear any sound or feel any vibrations coming from the machine as you can not hear ultrasound. Stop using the machine if you hear any unusual sound coming from it and call for immediate service.
- Keep the machine away from children

ADVANTAGES OF THE INVENTION.

Gly BetaC Aerostimulator improves and enhances quality of life:

Enhances the potency of anti-diabetic medication in controlling blood glucose.

Faster healing of diabetic foot ulcers.

Reduces fatigue, tiredness and muscular pains.

Reduces burning under the foot.

Increases flexibility of joints.

Improves blood circulation

Improves vision.

Increases energy levels.

Improves strength of lower limbs.

Improves quality of sleep.

It is also found that after using digital aerostimulator the intake of medication required reduced substantially.

In addition to this the following advantages are also found:

Improves Cell Permeability thereby enhancing the absorption of various drugs by human cells including larger molecules.

Can be used as a arthritic pain management device.

Can be used to enhance the absorption of skin care medicines by human skin for treatment of skin diseases / beauty treatment.

Because of repetitive stimulation by high frequency sound waves can be used for improving the metabolism of human cells.

IMPORTANT

Digital aerostimulator is not intended to replace medication but to enhance its effect.

It does not have any side effects so it wont affect if somebody else also sits in the room when the machine is on. However it is advised that simulation is taken only by the diabetics.

There is no food restrictions. You can continue with your usual diet as prescribed by the doctor.

There will be some variations in effect depending on the type of people.

The effectiveness can be maintained by increasing or decreasing time of exposure depending upon the type of people. Obese people can use the machine for longer time compared to normal people.

Caution:

It is strongly recommended to check your blood glucose levels before and after exposure

to digital aerostimulator. *Accordingly regulate the intake of anti-diabetic drugs as per the advice of your doctor.*

digital aerostimulator is not intended to be used as medical advice, or to diagnose, treat, cure, or prevent any disease nor should it be used for therapeutic purposes or a substitute for a Health professional's advice.

While specific embodiments of the invention have been shown and described herein for purposes of illustration, the protection afforded by any patent which may issue upon this application is not strictly limited to the disclosed embodiments; but rather extends to all structures and arrangements which fall fairly within the scope of the claims which are appended hereto.

We claim:

1. A digital aerostimulator comprising

An Input Bridge Section for supply of unregulated full wave (V_dc) to a voltage regulator ,op-amp and sine wave generator ,

A Microcontroller Power Section comprising a voltage regulator UA78M33 and capacitors for filtering and led for indication where in output from input bridge V_dc goes as input to UA78M33,

a Microcontroller Section centered around a microcontroller MSP430F2121IDW,

a DAC for full wave sine generation which is operationally coupled to the microcontroller, the Microcontroller section updates DAC with values stored in its look-up table to form a full sine wave at its output,

an OP-AMP voltage amplification stage and a regulated AC- current amplification stage,

an Output Driver section , a MosFET H-Bridge section and a transducer.

2. A digital aerostimulator as claimed in claim 1 wherein the input bridge supplies unregulated full wave (V_dc) to the input of UA78M33 Voltage Regulator (fig. 3), input of TLE2141 OPAMP and the input of LM317 Voltage Regulator which is used for Sine wave Generation.

3. A digital aerostimulator as claimed in claim 1 wherein the microcontroller power section comprises a voltage regulator UA78M33 and capacitors for filtering and led L1 for indication where in output from Input Bridge & Regulation section V_dc goes as input to UA78M33,UA78M33 provides regulated 3.3VDC for the microcontroller section.

4. A digital aerostimulator as claimed in claim 1 wherein the Microcontroller Section comprises a Microcontroller MSP430F5310 which works on 3.3VDC,all the capacitors are used as decoupling capacitors for Micro, PINs TEST, TDO, TDI, TMS, TCK, RST are used as JTAG pins to Program the firmware into microcontroller,a Crystal Oscillator Y1 which gives 16MHz clock frequency for Micro ,capacitors C1 & C2 are used as decoupling caps for crystal oscillator supply ,a switch S1 for Reset, JP 2 – 8 Pin Header for JTAG, P2.5 – TEST – used as PPM_LED, P4.0 – SCLK_DAC – Used to update DAC with full wave sine data, P4.1 – Din_DAC – Used to update DAC with full wave sine data, P4.2 – Not Used, P4.3 – FS - DAC – Used to update DAC with full wave sine data, P4. 4 – TX-TTL –Used to configure parameters, P4. 5 – RX-TTL –Used to configure parameters, P4.7 / P4.6 – FREQ_SWEEP1 – 20KHz To 60KHz Freq Sweep on this PIN, P1.0 – 100Hz_Scan – Not Used, P1.5 – Sweep_Driver_En – Used To enable / disable Driver UCC27425, P1.6 – Switch_Set – Used to Set Default parameters on machine boot up, P1.7 – PPM_LED – Used as PPM LED and
P2.0 – Switch – Not Used.

5. A digital aerostimulator as claimed in claim 1 wherein DAC is 12 bit, the microcontroller updates DAC with values stored in its look-up table to form a full sine wave at its output and 180 value of DAC code data make up the full sine wave with the following relationship
Wave=Vp*sin(angle)*256/(2*DAC_Ref_Vol).

6.A digital aerostimulator as claimed in claim 1 wherein op-amp voltage amplification stage comprises an op-amp configured as a non inverting single supply gain stage and the feedback resistor (R14) and input resistance (R15) decide the gain of the opamp such that Hardware Gain after op-amp = (1 + Rf/Ri) = 1+ 100k/6.8k = 15.706.

7. A digital aerostimulator as claimed in claim 1 wherein the regulated AC- current amplification stage comprises a 3 terminal voltage adjustable voltage regulator LM 317,the output of the op-amp stage is fed to the adjust pin of the LM317
, the LM317 has the ability to follow the adjust pin at the output gives the full sine wave with the required current(~1.5A) which powers the H-Bridge Section.

8. A digital aerostimulator as claimed in claim 1 wherein the output Driver section comprises a Driver IC U5 (UCC27425P) which drives Sweep signal from microcontroller, CAPs C16, C6 & C7 are used as decoupling Capacitors for UCC27425P, Zener Diodes – Z2 & Z3 are used voltage regulator for UCC27425,the output from this driver corresponds to Vdriver (+12V) and output from this section goes as gate drive for MosFet Section.

9. A digital aerostimulator as claimed in claim 1 wherein the MosFET H-Bridge section comprises H-Bridge ZXMHC3A01T8 (3Amp, 30V) (Zetex make),capacitors C5, C26 are used as decoupling capacitors for H-Bridge, diodes D7 & D5 are used to cut down offset voltage, the output section is powered with 100Hz full wave rectified labeled 20Vpp_AC_100Hz and this gives a 100Hz modulated wave with 20 KHz – 60 KHz encompassed frequency sweep.

10.A method of **regulating /Managing blood glucose levels of a subject by promoting cell metabolism with the application of low frequency (20Khz to 70 Khz) airborne ultrasound wave comprising the steps of**

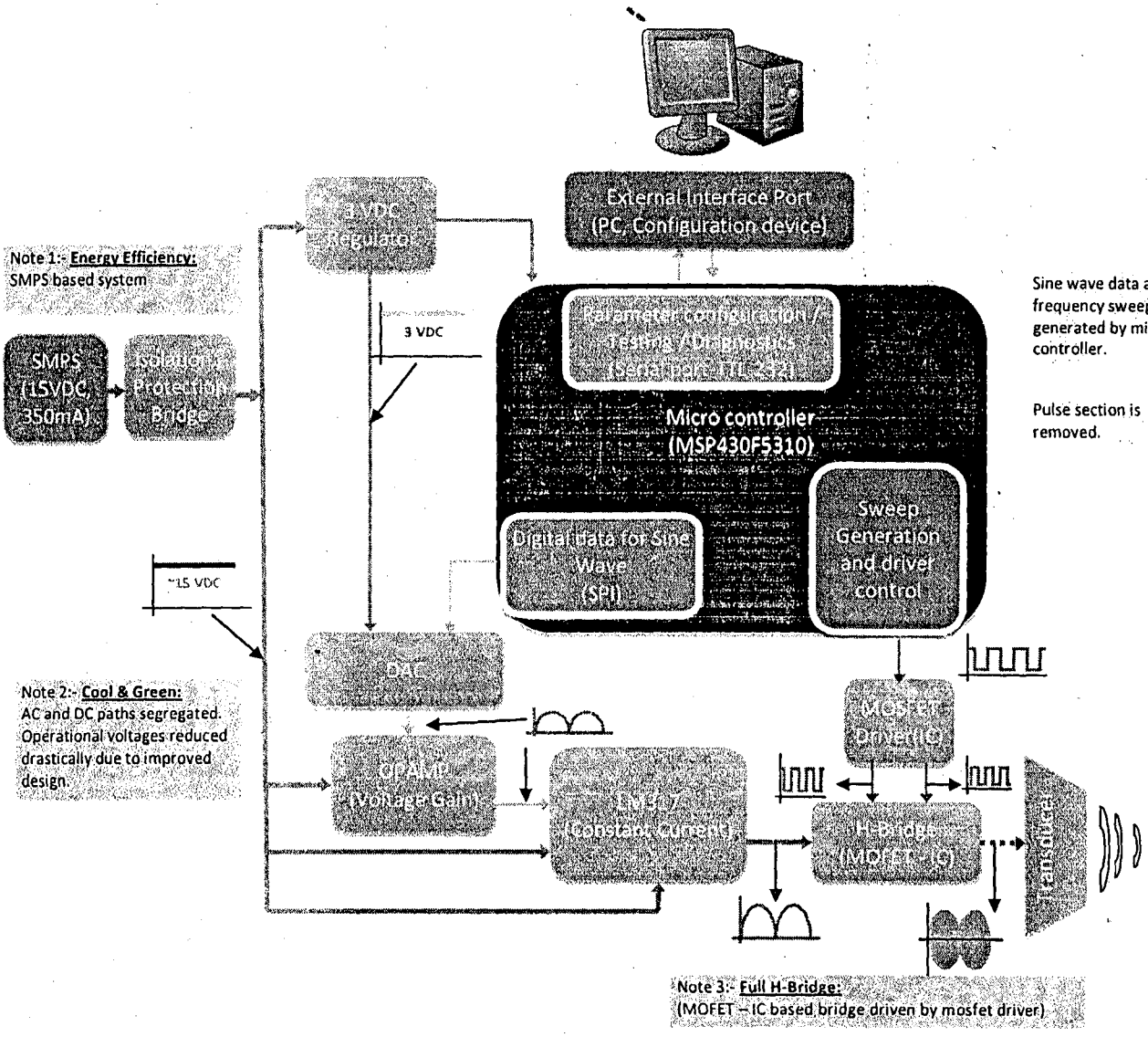
powering on the digital aerostimulator,
making the subject sitting at a minimum distance of 4 feet and a maximum distance of 6 feet away from the aerostimulator for mimimum of 10 minutes and maximum of 20 minutes and repeating the same after a minimum gap of 4 hrs.

11.A digital aerostimulator substantially described as herein with reference to the figures of the accompanying drawings.

Dated this 01st day of August, 2012

GlyBetac – Digital

(Fully micro controlled)



Note 4:- **Production Friendliness :** Calibrating / testing / diagnostics done using serial port (RS-232) using a PC or a device configuration tool. Automated software configuration capabilities.

Fig - 1A

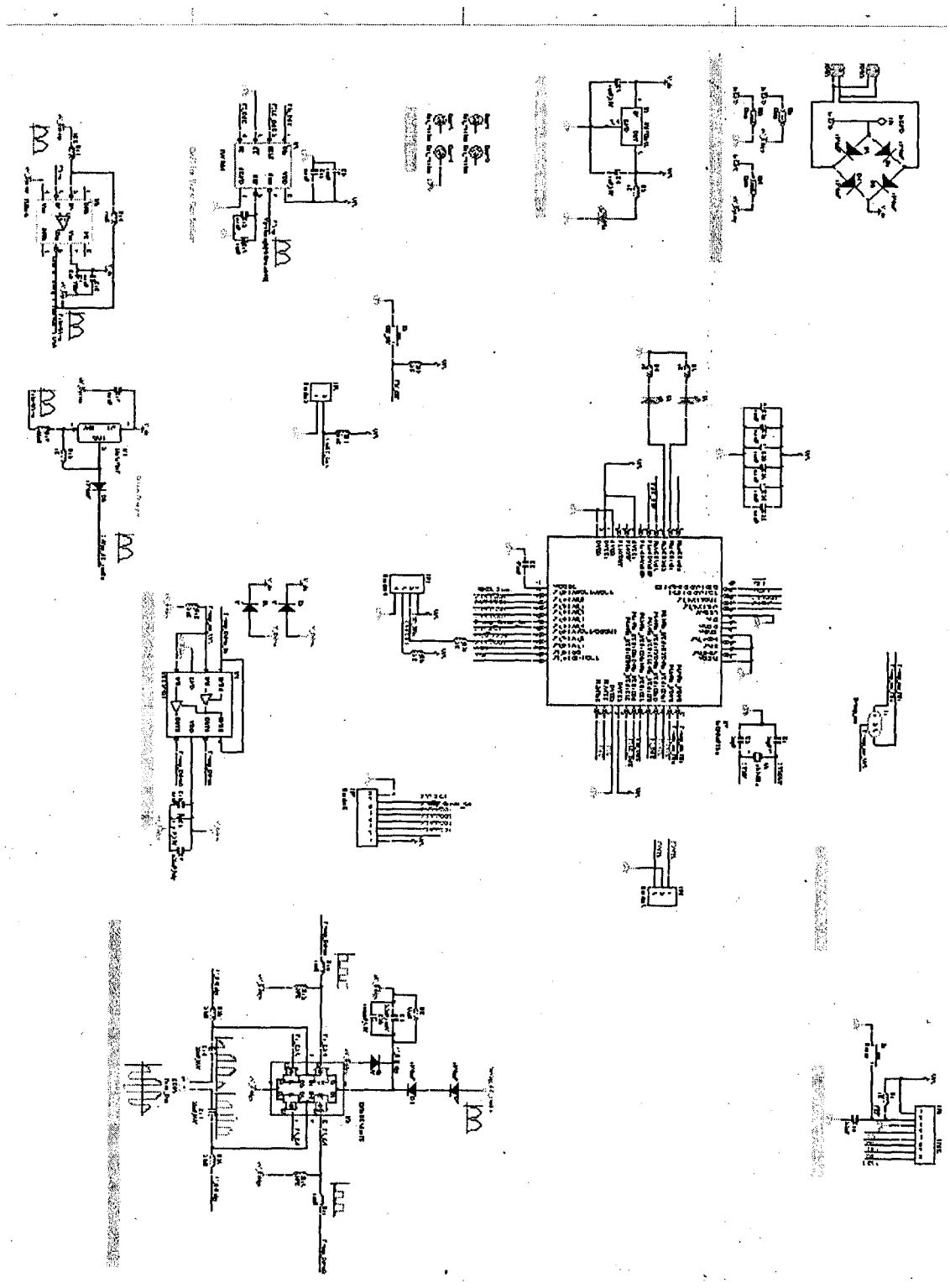
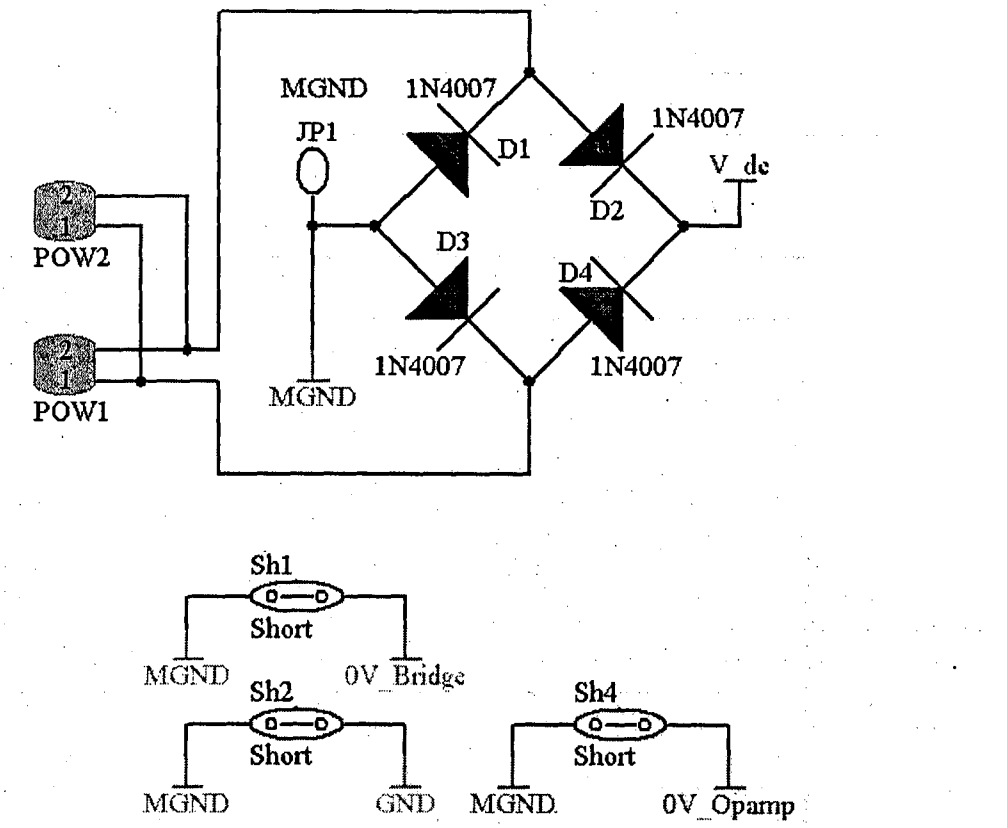


Fig - 1B

Section.1-1

Input Bridge Section:

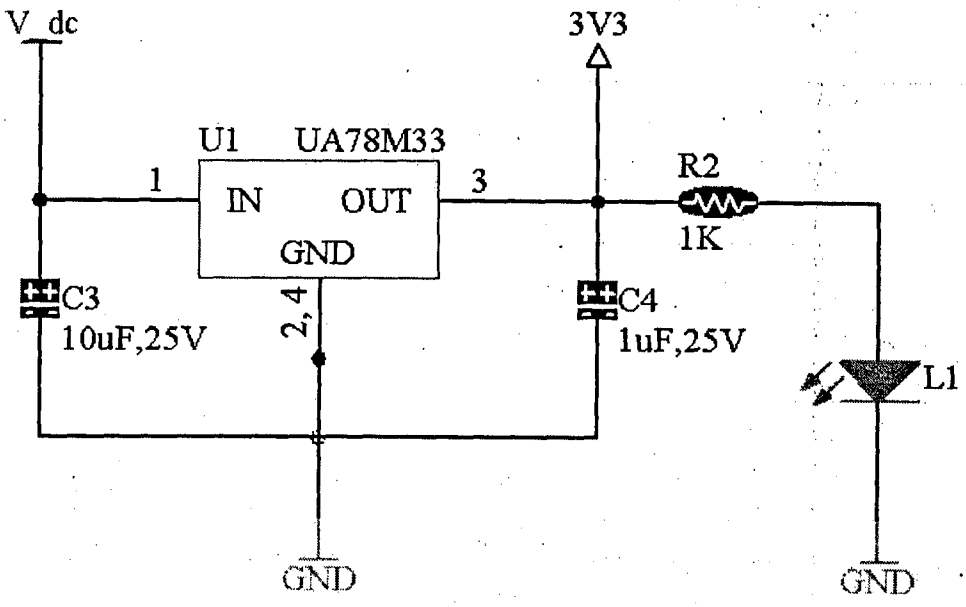


Input Diode Protection and Fuse

Fig. 2

Section.1-2

Microcontroller Power Section:



Microcontroller Power Section

Fig. 3

Section.1-3

Microcontroller Section:

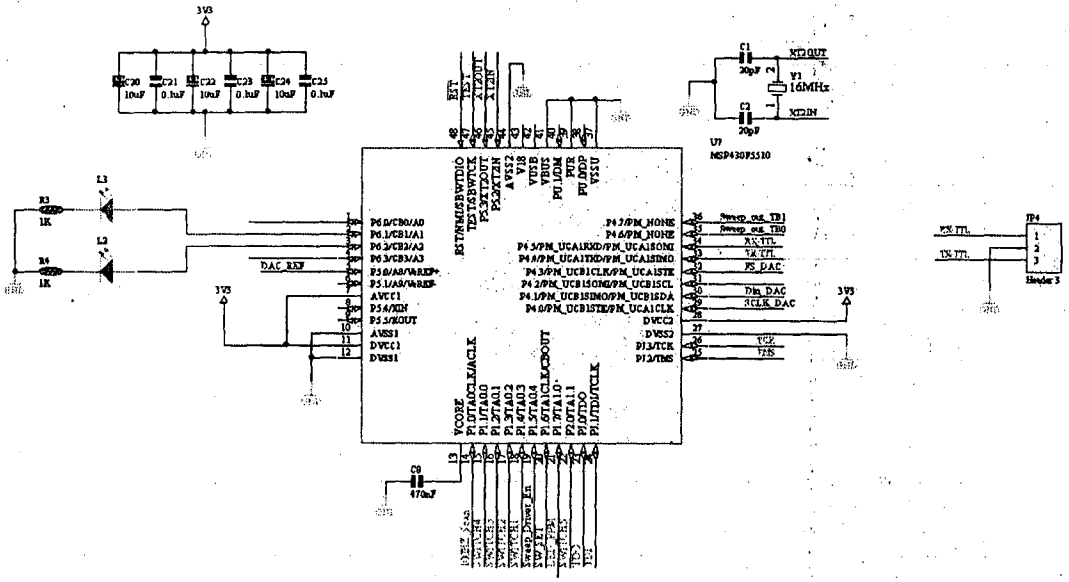
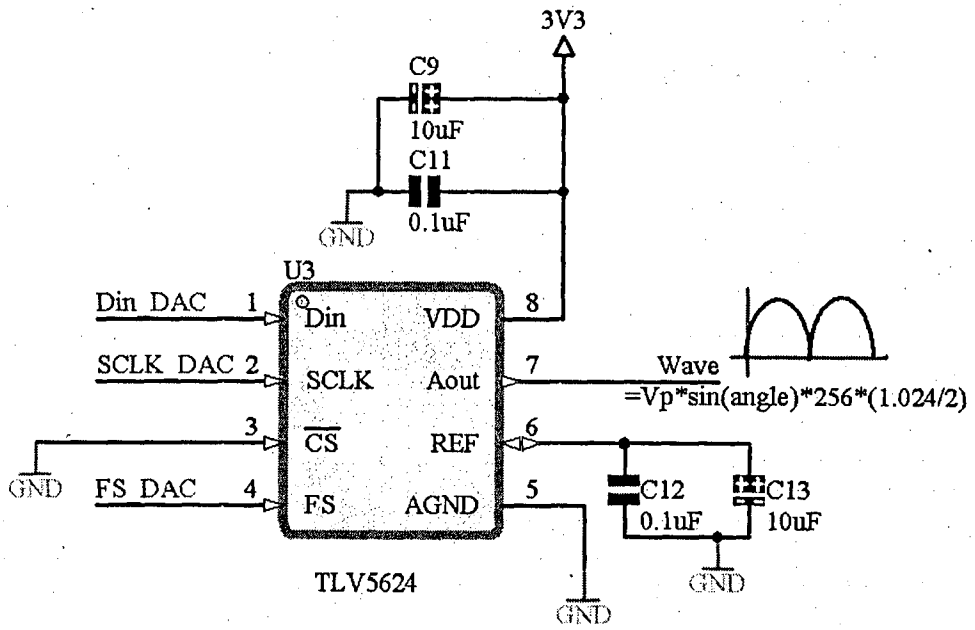


Fig. 4

Section.1-4

12-bit DAC for Full Sine wave generation:

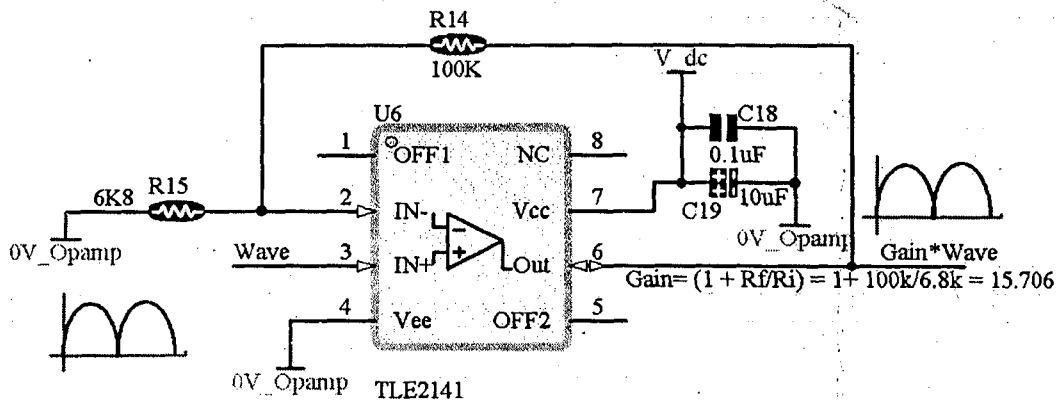


DAC for Wave Gen Section

Fig. 5

Section.1-5

Opamp for voltage Amplification:



Voltage Gain - OPAMP Section

Fig. 6

Section.1-6

Regulated AC - Current Amplification Stage:

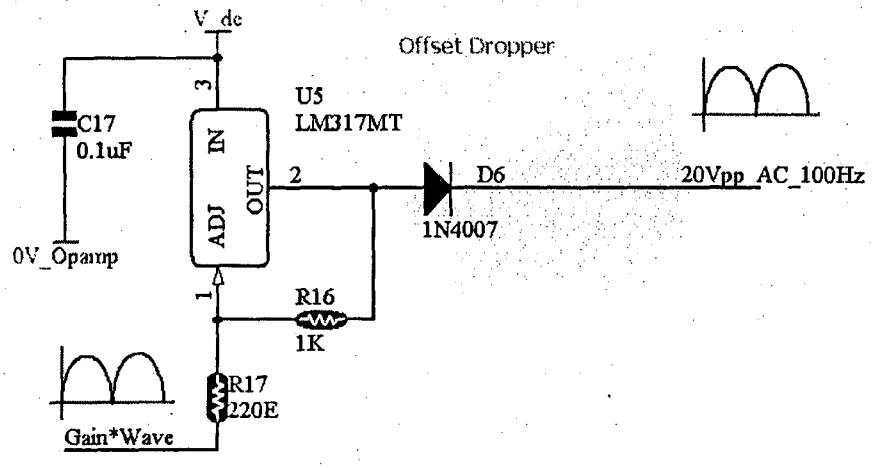


Fig. 7

Section.1-7

Output Driver Section:

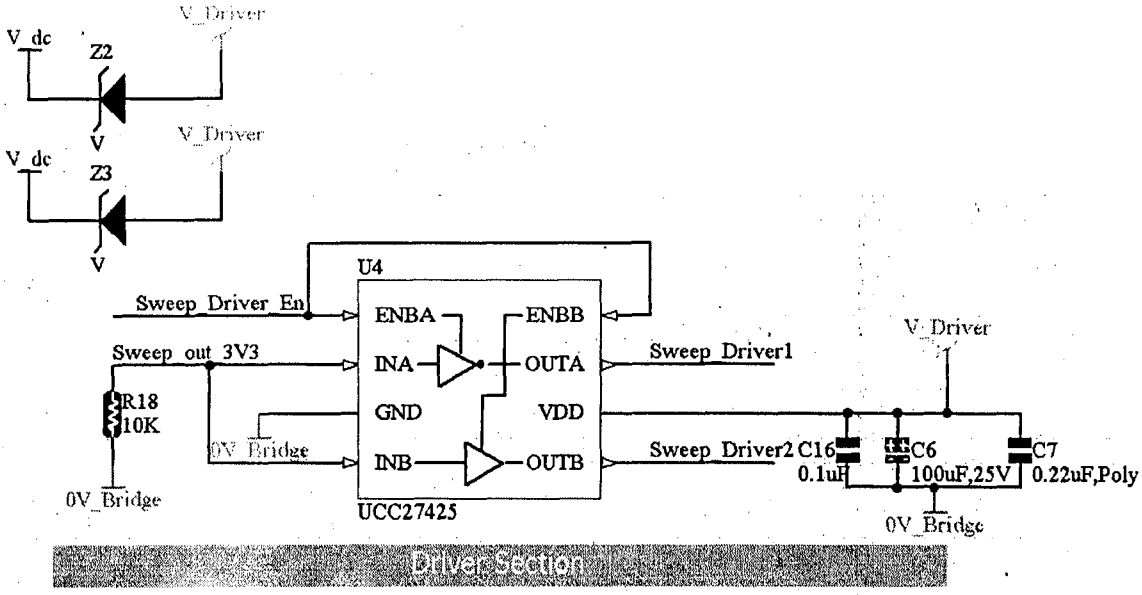


Fig. 8

Section.1-8

MosFet H-Bridge Section:

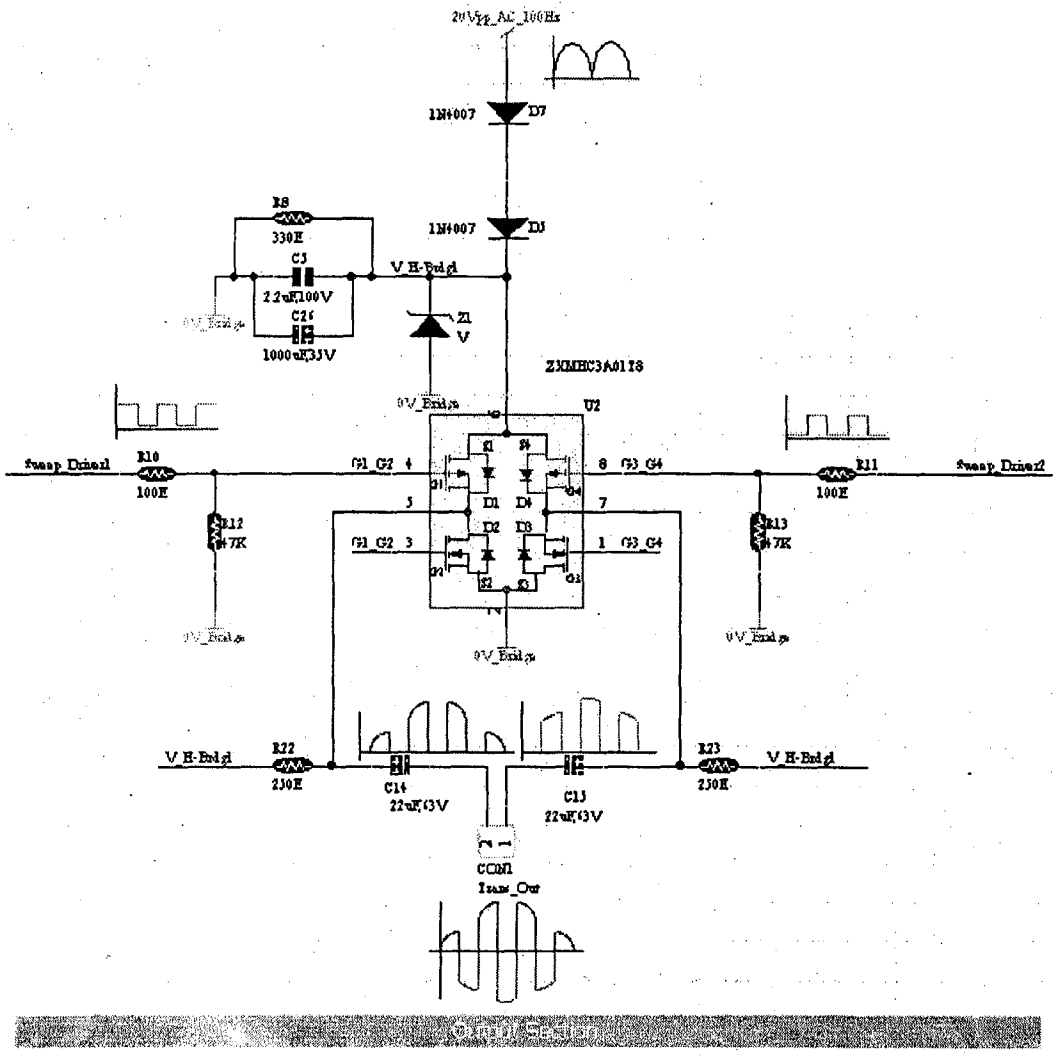
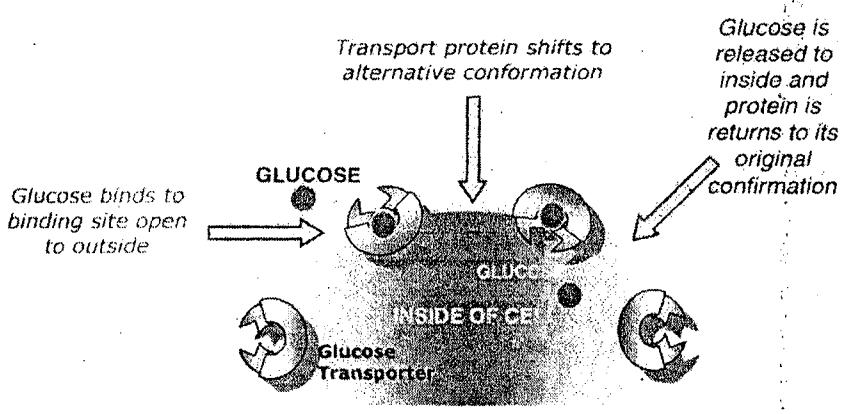


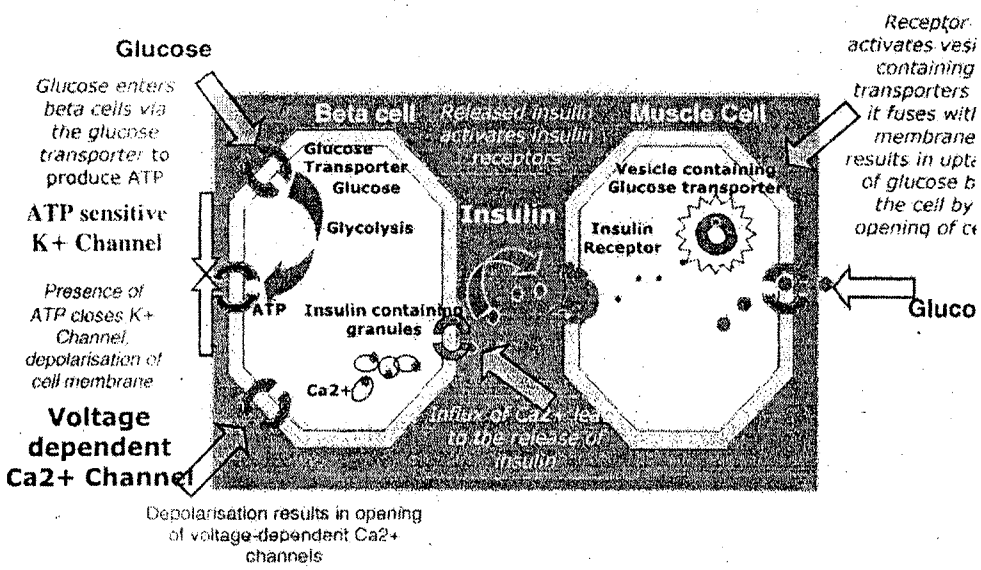
Fig. 9

Facilitated diffusion of Glucose



The carrier protein, the Glucose transporter in the cell, alters conformation to facilitate the transport of glucose. Only thermal energy is required for the conformational change of the protein.

Insulin release and action potential



Glucose enters beta cells via the glucose transporter and ATP is generated by glycolysis. This results in closure of ATP-sensitive K^+ channels, depolarization of the plasma membrane, and opening of voltage-dependent Ca^{2+} channels. The influx of Ca^{2+} leads to the release of insulin, which is carried in the bloodstream to cells throughout the body where it binds to insulin receptors. That activate vesicle containing glucose transporters. This results in translocation of the glucose transporter and uptake of glucose by the cell.

Fig - 10

The biological functions of Na+/K+ pump

The active transport of Na+/K+ ATPase is used to maintain electrochemical ion gradients, and thereby maintains cell's excitability.

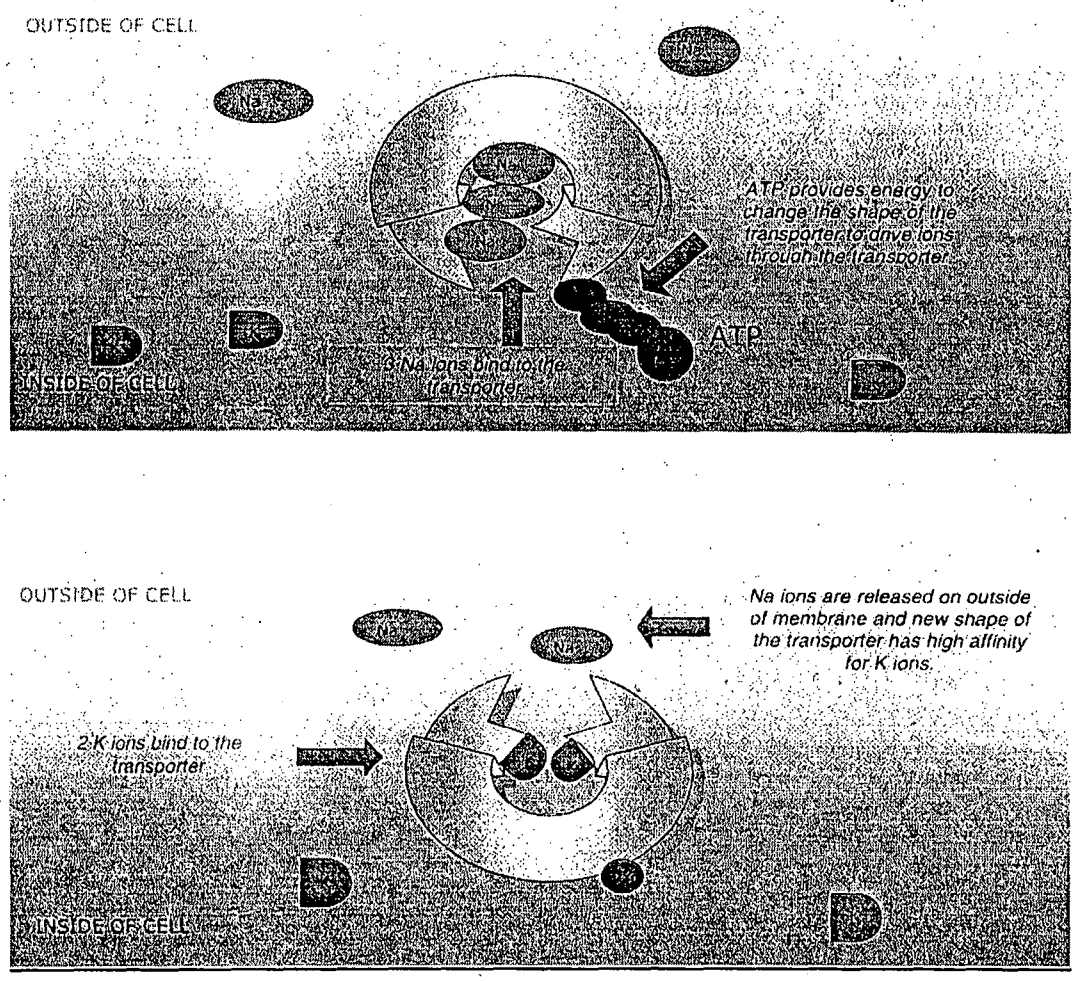


Fig - 11

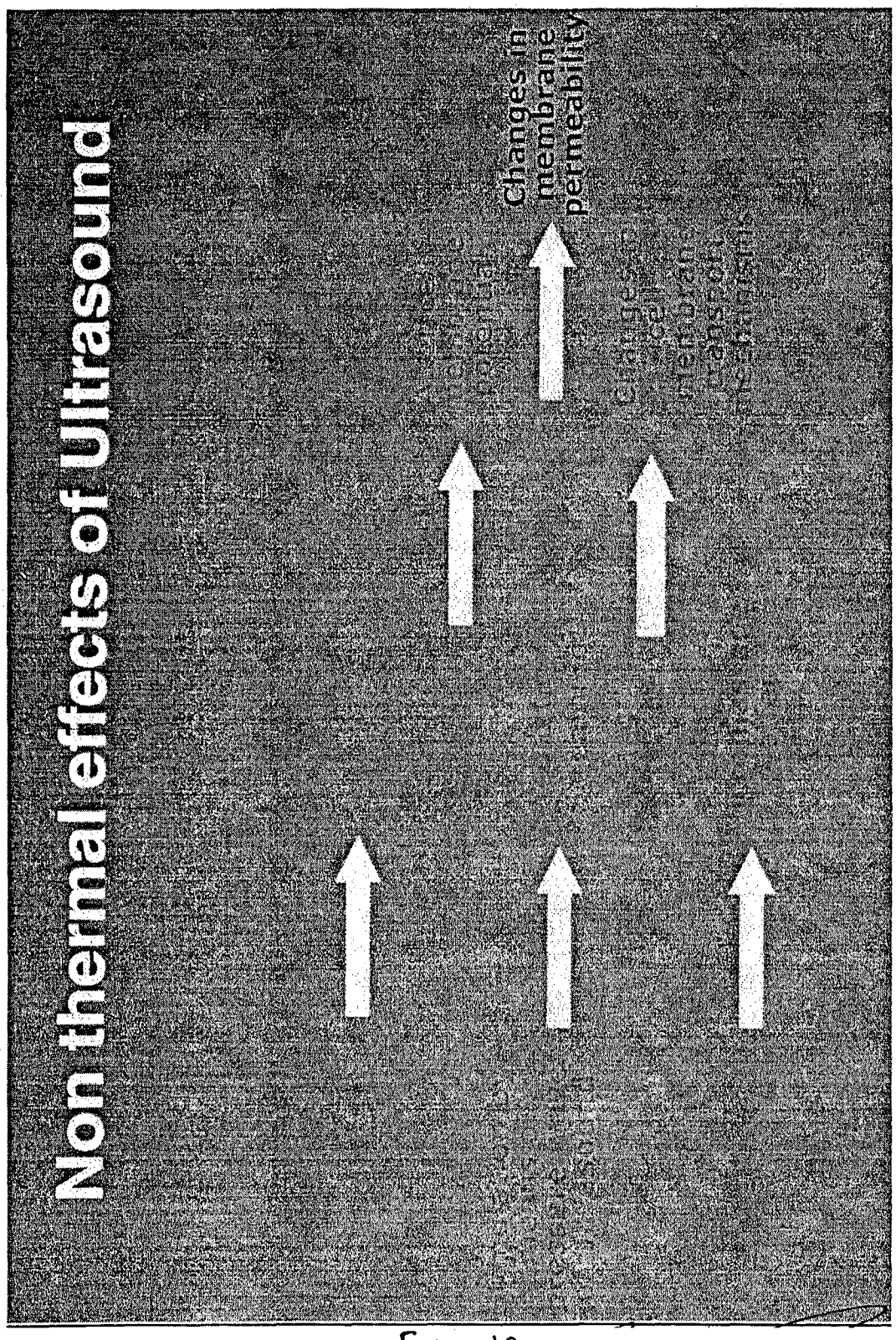

Non thermal effects of Ultrasound
Changes in membrane permeability

Fig - 12

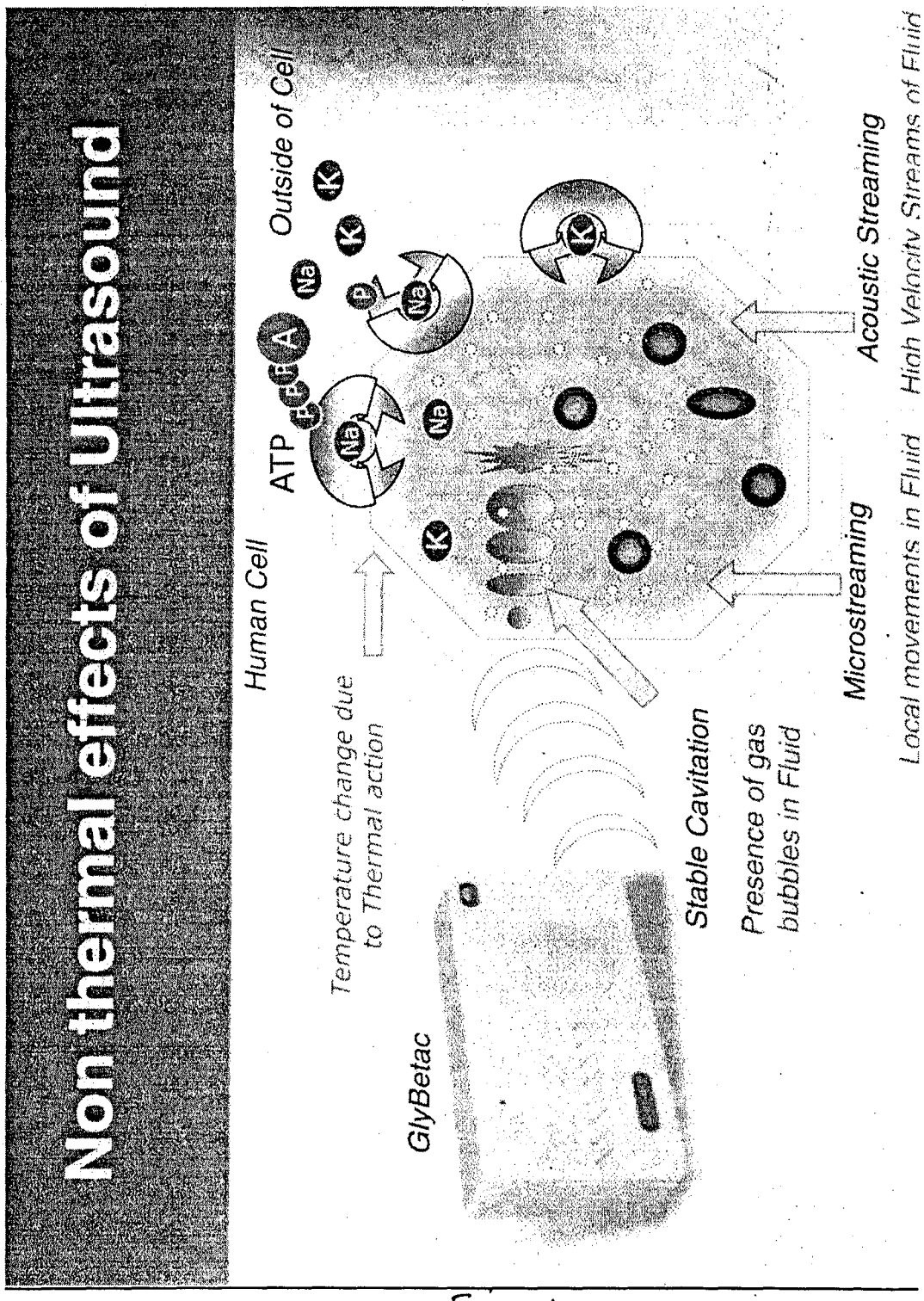
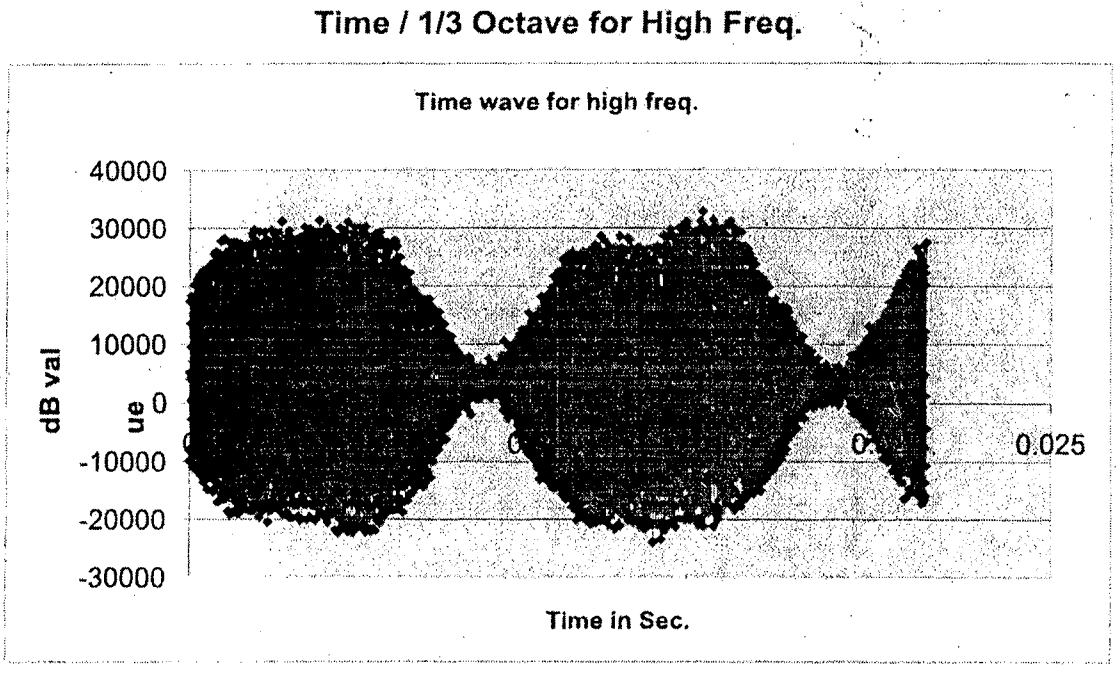

Non thermal effects of Ultrasound
Human Cell
Outside of Cell
ATP
Na
K
P
Temperature change due to Thermal action
GlyBetac
Stable Cavitation
Presence of gas bubbles in Fluid
Microstreaming
Local movements in Fluid
Acoustic Streaming
High Velocity Streams of Fluid

Fig - 13


Time / 1/3 Octave for High Freq.
Time wave for high freq.
40000
30000
20000
10000
0
-10000
-20000
-30000
dB val
ue
0.025
Time in Sec.

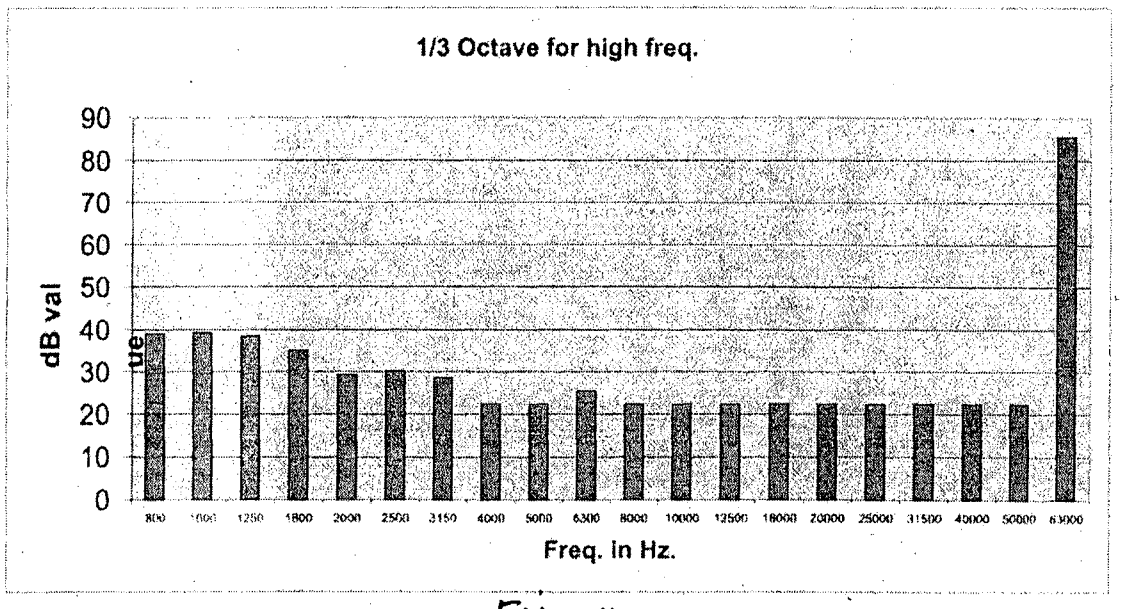
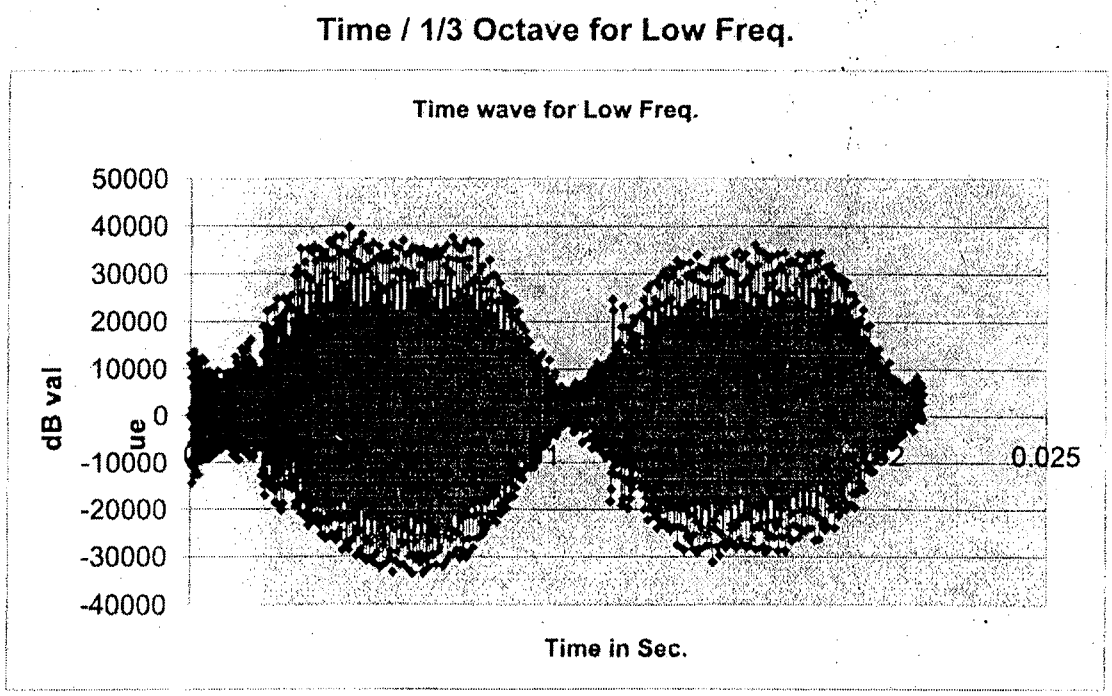

1/3 Octave for high freq.
90
80
70
60
50
40
30
20
10
0
dB val
ue
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
12500
16000
20000
25000
31500
40000
50000
63000
Freq. in Hz.

Fig - 14


Time / 1/3 Octave for Low Freq.
Time wave for Low Freq.
50000
40000
30000
20000
10000
0
-10000
-20000
-30000
-40000
dB val
ue
1
2
0.025
Time in Sec.

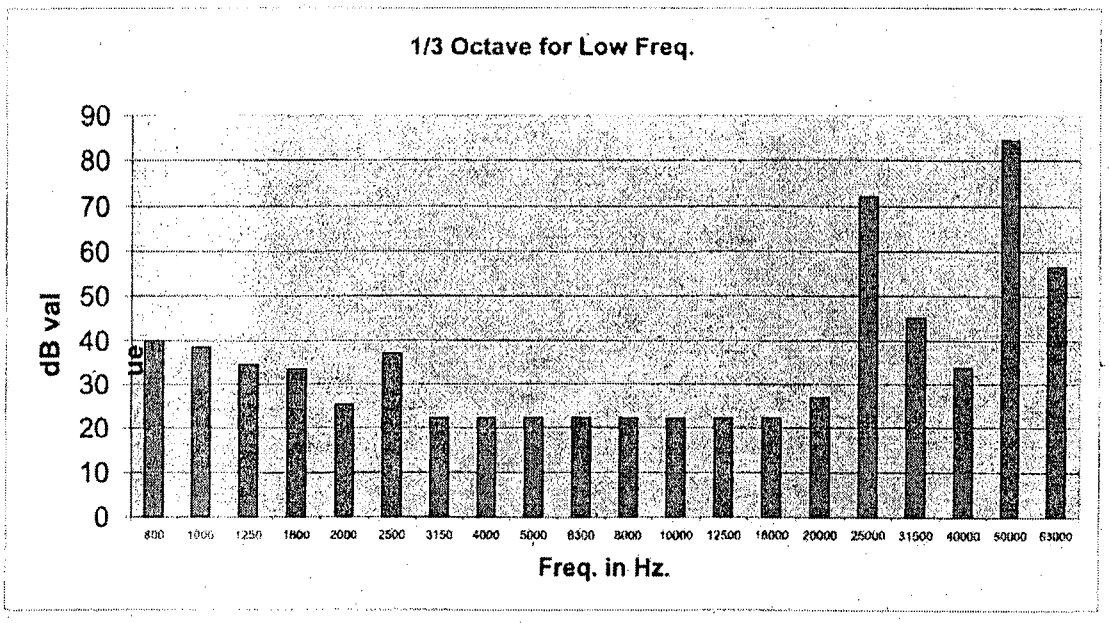
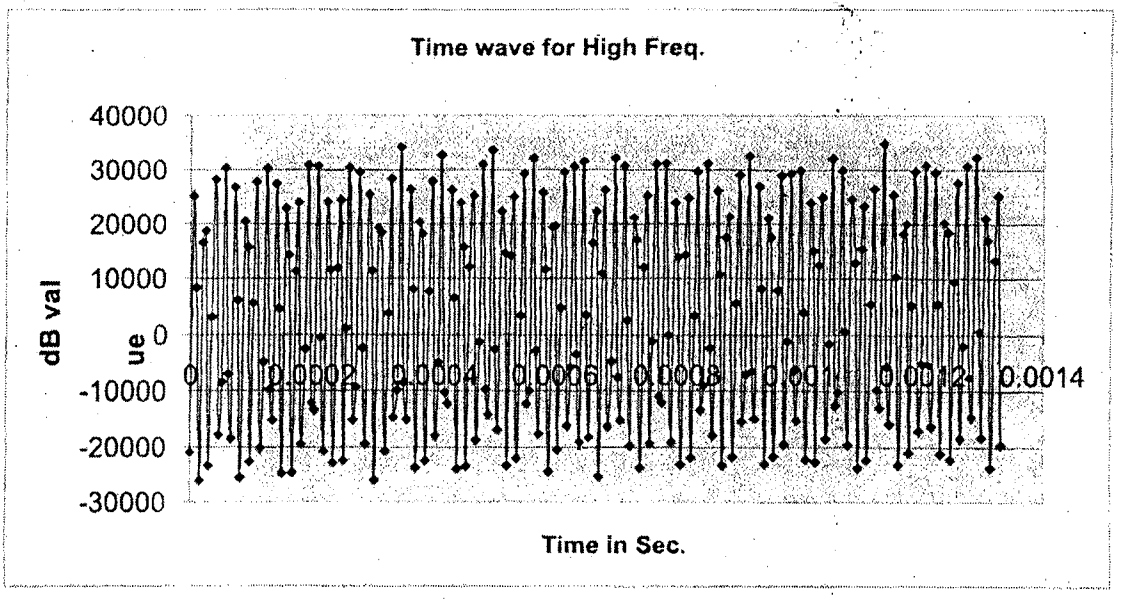

1/3 Octave for Low Freq.
90
80
70
60
50
40
30
20
10
0
dB val
ue
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
12500
16000
20000
25000
31500
40000
50000
63000
Freq. in Hz.

Fig - 15

Time / FFT for High Freq.



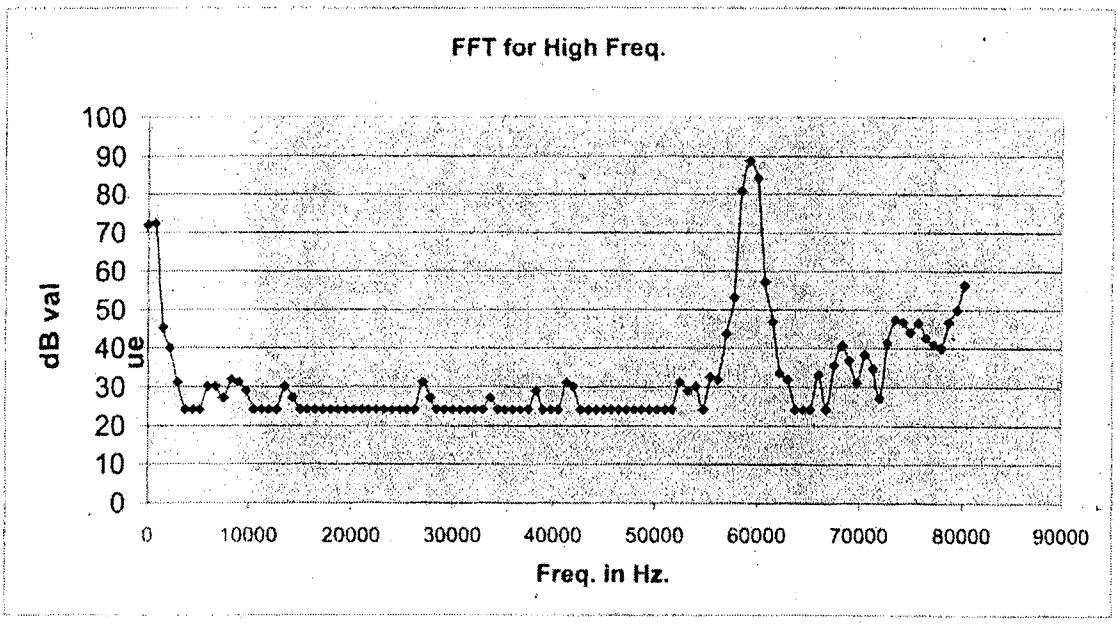
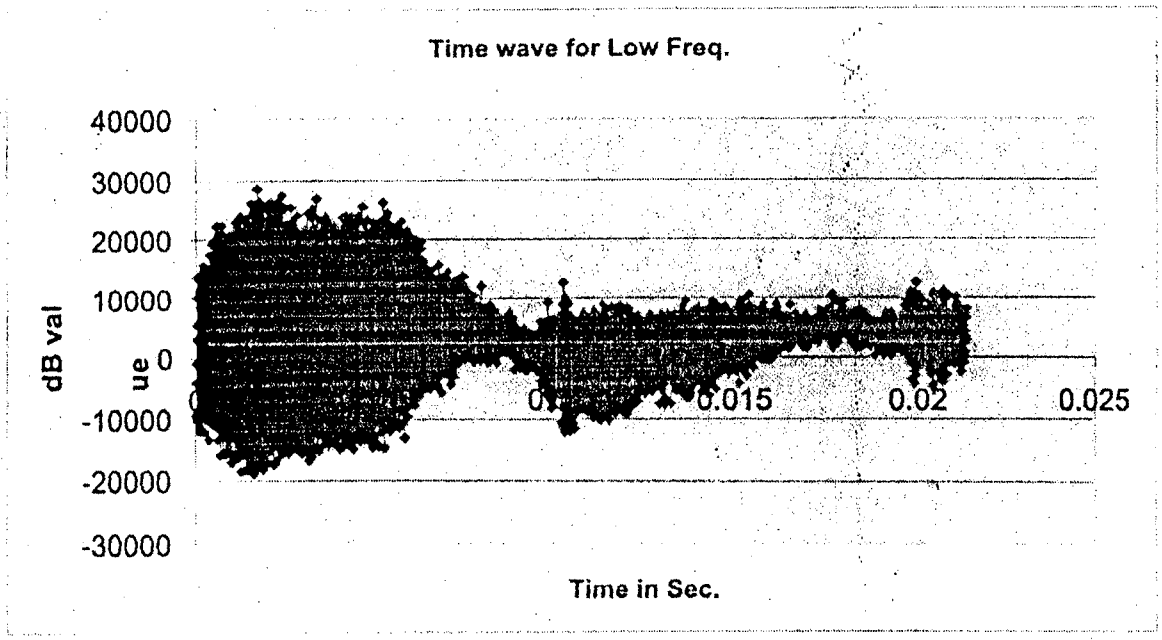


Fig - 16

Time / 1/1 Octave for Low Freq.



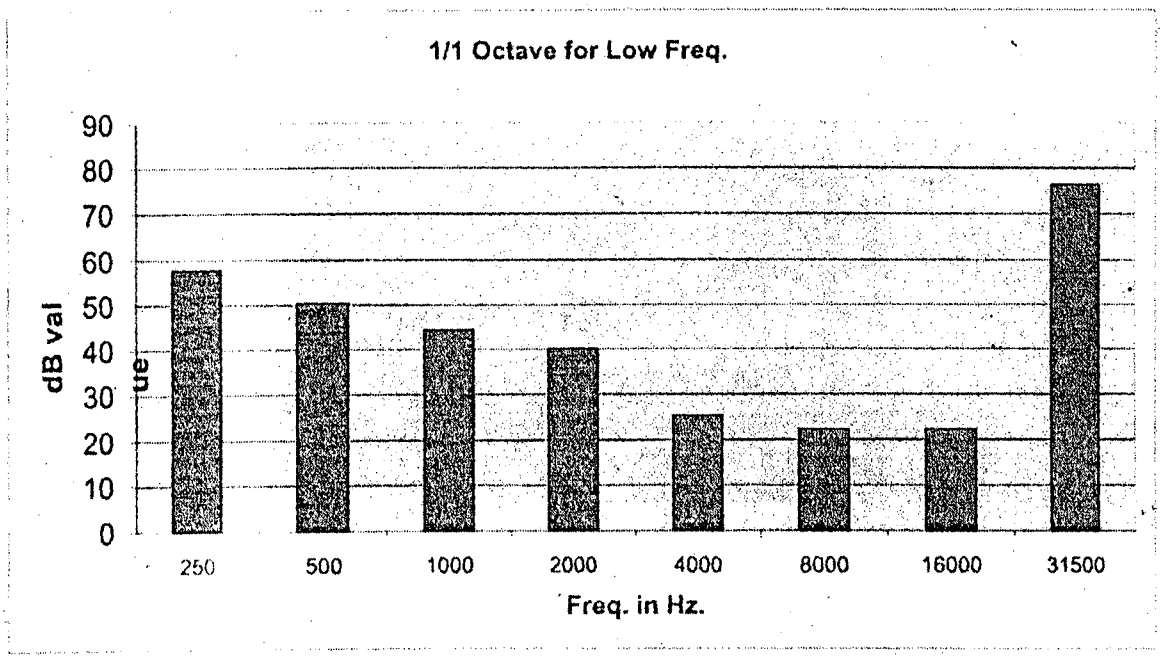
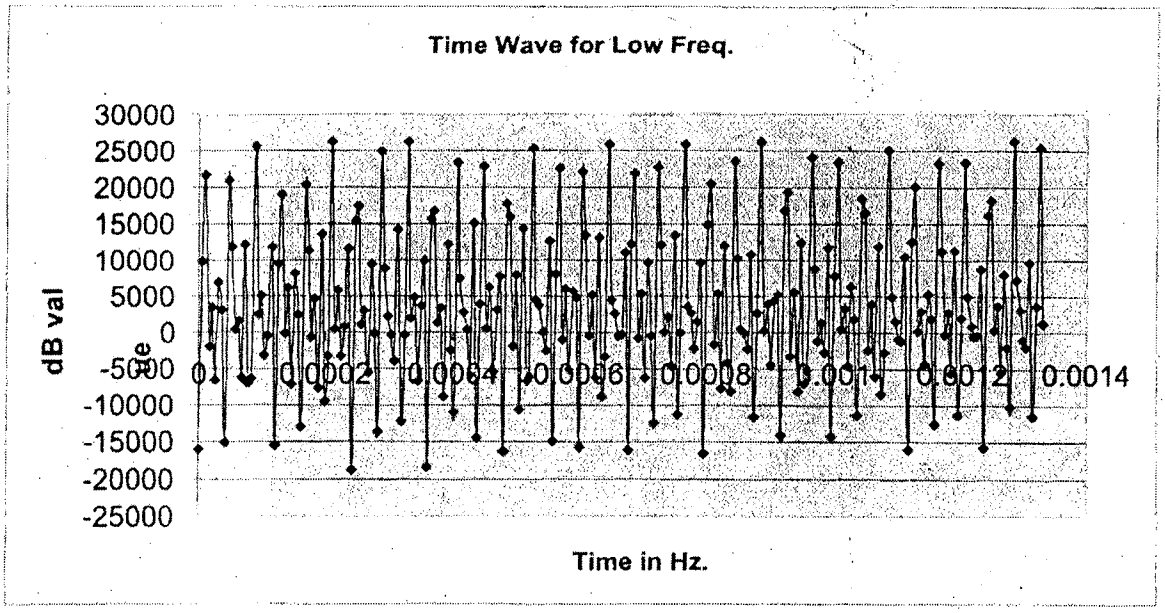


Fig - 17

Time / FFT for Low Freq.



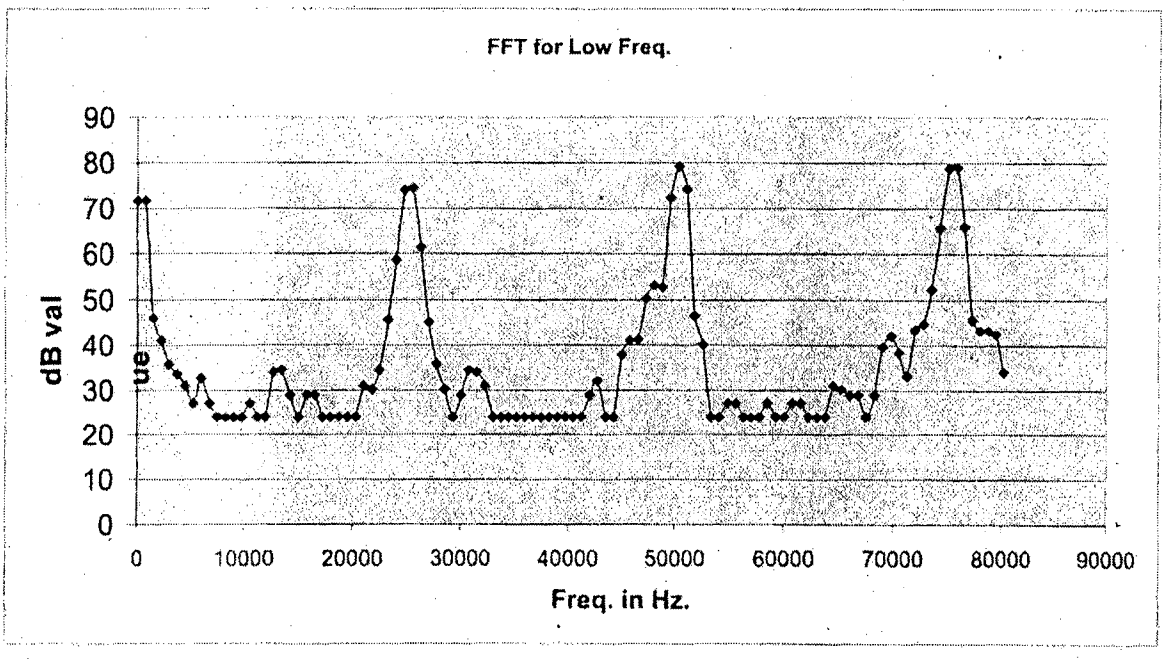


Fig 18

(V. RAMU)
AGENT FOR THE APPLICANT.

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000642

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61H23/02 A61M37/00 A61N7/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61H A61M A61N F02M G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	"GlyBetaC Brochure", , 2 March 2011 (2011-03-02), XP055063086, Website of MASER ELECTRONICS (P) LTD Retrieved from the Internet: URL:http://web.archive.org/web/20110302105935/http://www.maserindia.com/pdf/GlyBetaC_Brochure.pdf [retrieved on 2013-05-15]	1-4,8
A	the whole document	5-7,9
	----- -/--	

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 May 2013	11/06/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Schnurbusch, Daniel

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000642

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	"GlyBetaC product page", , 18 July 2010 (2010-07-18), XP055063090, Website of MASER ELECTRONICS (P) LTD Retrieved from the Internet: URL:http://web.archive.org/web/20100718170828/http://www.maserindia.com/Glybetac.htm] [retrieved on 2013-05-15] the whole document	1-9

Y	US 5 460 595 A (HALL DUANE O [US] ET AL) 24 October 1995 (1995-10-24)	1-4,8
A	column 2, line 50 - column 3, line 20 column 3, line 57 - column 5, line 6; figures 1-2 column 6, line 12 - column 11, line 56; figures 4A-J; table 1	5-7,9

Y	US 2004/013420 A1 (HARA YOSHIHIRO [JP]) 22 January 2004 (2004-01-22)	1-4,8
A	paragraphs [0029] - [0045]; figures 1-3 paragraphs [0066] - [0068]; figures 5,7 paragraphs [0115] - [0123]; figures 10-12	5-7,9

A	US 2008/281238 A1 (OOHASHI TSUTOMU [JP] ET AL) 13 November 2008 (2008-11-13) paragraphs [0049] - [0062]; figures 12-21	1-9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2012/000642

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [X] Claims Nos.: 10
because they relate to subject matter not required to be searched by this Authority, namely:

see FURTHER INFORMATION sheet PCT/ISA/210

2. [X] Claims Nos.: 11
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210

3. [ ] Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 10

Method claim 10 defines a method for treatment of the human or animal body by therapy practised on the human or animal body, because "[...] method of regulating /managing blood glucose levels of a subject by [...] the steps of [...]" and "[...] a revolutionary product [...] with the sole purpose of regulating the blood glucose levels of millions of Diabetics world over and benefits the society on the whole [sic] [...]" (claim 10 and p. 1 last paragraph) is seen as a therapeutic step, treating or curing diabetics, performed on a patient by reducing the blood glucose levels. Therefore no search has been performed for the subject-matter of this claim (see Article 17 (2) PCT and Rule 39.1.(iv) PCT) and no written opinion is required for the subject-matter of these method claims (see Rule 43bis.1 and Rule 67.1 (iv) PCT).

Continuation of Box II.2

Claims Nos.: 11

Present claim 11 relates to an extremely large number of possible products/methods by just referring to the figures. Support and disclosure in the sense of Article 6 and 5 PCT (see also Rule 6.2(a) PCT) is not provided. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search of claim 11 (PCT Guidelines 9.19 and 9.23). The search of claim 11 was therefore restricted to those claimed products/methods which appear to be supported, namely what has been claimed in claims 1-9 in words.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IN2012/000642

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5460595 A	24-10-1995	US 5460595 A	24-10-1995
		WO 9627358 A1	12-09-1996
US 2004013420 A1	22-01-2004	JP 3832396 B2	11-10-2006
		JP 2004056878 A	19-02-2004
		US 2004013420 A1	22-01-2004
US 2008281238 A1	13-11-2008	JP 4572214 B2	04-11-2010
		JP 2008278999 A	20-11-2008
		US 2008281238 A1	13-11-2008