ELECTRONIC PAIN RELIEVER

INTRODUCTION

People are becoming more health conscious these days and hence the application of electronics in the medical field is gaining importance. Physiotherapy is a branch of medical science that views human movement as the human soul and once which is inevitable for the well being of individuals. It works based on the human response (stimulation) and does not involve any drugs or surgery. Further recurrence of the disease can also be avoided.

Electronic Pain Reliever can be used for physiotherapy treatments. Here small electrical signals are created by making use of multivibrator circuits and these signals are directly applied to the nerves connecting the stressed part of the body to the spinal cord, thereby connecting it to the brain. These signals help reduce the sensitivity of the specific nerves and hence the user is relieved of the pain. The main applications include treatment for headache, muscular pain and revival of frozen muscles that impair movement.

MARKET POTENTIAL

At present, the central and state governments are promoting the Electronics and IT Industry. The present 'Make in India' policy is practical step traversed in this regard. The demand in the Indian market for electronics is expected to touch $400 billion by 2020 and Consumer electronics being the major segment within this. Under the Modified Special Incentive Package Scheme, the Government of India will provide benefits of up to Rs. 100 billion for the industry segment. India contributes just 1.3% of the total global electronics production of $1.7 billion. Hence there is immense scope for electronics in India. Application of electronics in medical domain is an emerging field.

There are many Small and Medium Enterprises involved in the production of consumer electronics catering to the small and medium level applications. Many make use of latest technologies and even make use of the technologies developed by the premium Research and Development Institutions in India.

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The application of electronics in the medical domain is gaining importance owing to an increase in the medical infrastructure and health awareness among the public. The present fast moving generation prefers everything to be handy and this is where personal medical equipments like the Electronic Pain Reliever find importance. There are only few MSMEs manufacturing equipments of this sort in India which means opportunity still awaits the needy. This product with the latest features like digital display, electronic meter and after sales support has ample scope both in India and abroad.

BASIS & PRESUMPTIONS

1. The production is based on a single shift of 8 hours per day and 300 working days a year.
2. The capacity utilization is taken as 100% for all financial calculations.
3. The salaries & wages, cost of raw materials, utilities etc. are based on the rates prevailing in Kerala at present. These are subject to vary location and time.
4. The Project Preparation cost etc. whenever requires would be covered under pre – operative expenses.
5. The Break Even point considered is of full capacity utilization.
6. The prevailing market rate of interest for SME varies from 13 to 17% for nationalized banks in India. For calculations, it is assumed to be 15%.
7. The production and testing machinery required for the product is indicated. An additional requirements as regards testing can be met by using the facilities available at Electronics Test and Development Centers and others similar institutions.
8. Margin money is 25% of the total capital requirement.

IMPLEMENTATION SCHEDULE

It will take one year to complete all formalities to start commercial production. A

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period of 3 months is assumed for the sanction of loan by the bank. In continuation to that, a period of about 4 months is expected for procurement of machinery and their installations. A trial run can be performed by the 11th month and the commercial production can be started by the 12th month. When imported machinery is required, the implementation schedule may go beyond the expected period by 3 or 4 months.

TECHNICAL ASPECTS

The system mainly has three main units: a 2/4 channel Pain Reliever, timer and display units. The circuit contains Integrated Circuits wired as multivibrators generating pulses of about 80Hz. Timer Circuit is implemented using Timer IC. The LCD driver circuit is attached to the stimulator unit.

Technical Specification:

- Output is indicated by the digital LCD meter.
- Digital time 0 to 99 minutes and preset at 15 minutes.

- Up/Down Start operation with timer and Buzzer that sounds on expiry of preset time.
  - Output Voltage of 0 to 60V.
  - Output Current of 150 mA (Maximum).

Manufacturing Process:

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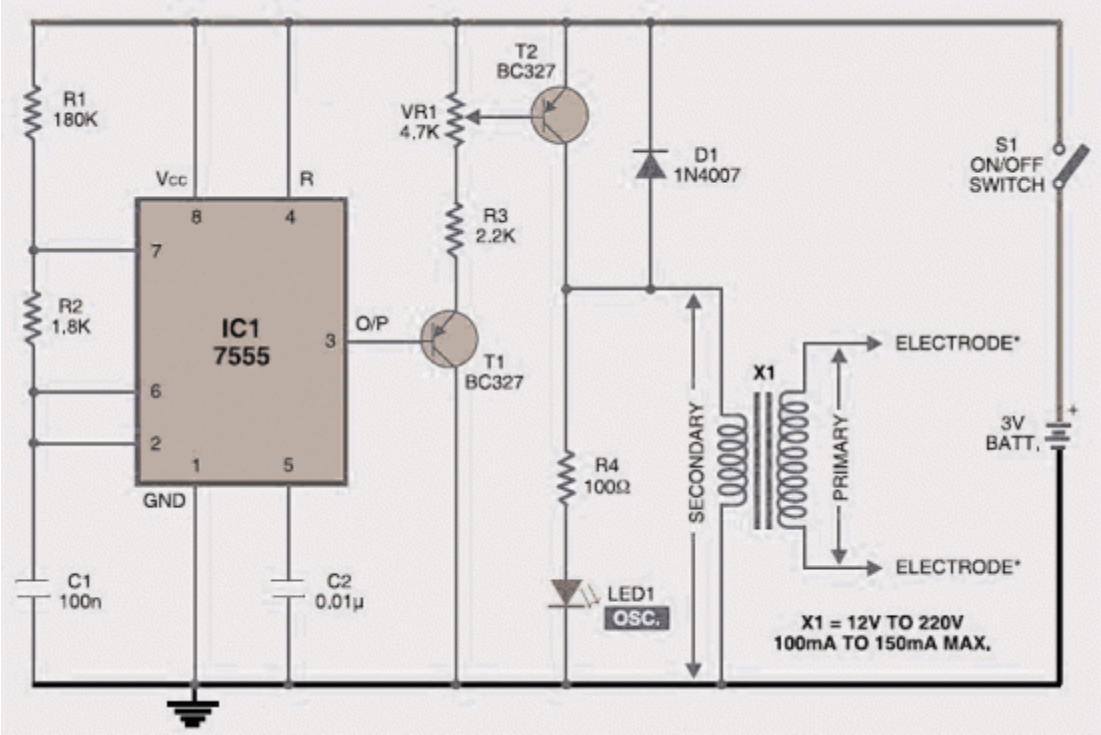

The circuit shown above may be used for generation of pulses that can be applied to nerves using electrodes. IC 7555 serves as an astable mutivibrator generating symmetric pulses of about 80Hz. Using potentiometer VR1, the current through sensing electrodes can be controlled. The brightness of LED1 serves as an indicator for pulse amplitude. We have a small mains transformer X1 which transforms 220V at its input to 12 V at its output. This is connected here in reverse mode which means that the output voltage is quite high in the range of about 60V. There is no risk of electric shock as the output current is quite low. The incoming raw materials and components are tested for required quality and specifications. The components are formed, shaped and soldered on pre-designed printed circuit boards and tested for desired performance. The tested PCBs are fixed in the plastic enclosure, LCD display unit is fixed, other controls are connected and connection is made through proper wiring. The batteries are connected, all mechanical assemblies are completed and the whole unit is checked for required performance by measuring the amplitude and width of the pulse generated. Finally the tested products are packed with attractive carton for dispatch to

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dealers/customers.

Production Capacity:

- Two Channel Pain Reliever: 3000 nos.
- Four Channel Pain Reliever: 3000 nos.
- Total Value: `. 1,50,00,000/-.

Pollution Control:

In electronic industry fumes and gases are released during hand soldering/wave soldering/dip soldering, which are harmful to people as well as environment and the end products. Alternate technologies may be used to phase out the existing polluting technologies. Numerous new fluxes have been developed containing 2 – 10% solids as opposed to the traditional 15 – 33% solids. Electronic industry uses CFC, Carbon Tetrachloride and Methyl Chloroform for Cleaning of printed circuit boards after assembly to remove flux residues left after soldering, and various kinds of foams for packaging.

Many alternative solvents could replace CFC-113 and Methyl Chloroform in electronics cleaning. Other Chlorinated solvents such as Trichloroethylene, Perchloroethylene and Methylene Chloride have been used as effective cleaners in electronics industry for many years. Other organic solvents such as Ketones and Alcohols are effective in removing both solder fluxes and many polar contaminants.

Energy Conservation:

Conservation of electricity is gaining importance these days. The following steps may be used for conservation of electrical energy.

- Adoption of energy saving technologies, production aids and testing facilities.
- Efficient management of process/manufacturing machineries and systems, Quality Control and Systems for yielding maximum energy efficiency and conservation.
- Use of temperature controlled soldering and de – soldering.
- Periodic maintenance of motors, compressors etc.

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- Use of power factor correction capacitors.
- Proper layout of lighting systems and switching off lights when not in use.

Financial Aspects

Fixed Capital:

1. Land & Building

Built up Area	200 sq.mtr
Office, Stores	50 sq.mtr
Assembly & Testing	150 sq.mtr
Rent per annum	`. 1,80,000

2. Machinery & Equipments

Sl. No	Description	Unit	Cost(`.)
1	Digital Storage Oscilloscope 100 MHz	1	40,000
2	Temperature Controlled Soldering Unit	3	21,000
3	LCR Meter(Programmable)	1	25,000
4	Digital Multimeter 4 ¾ digit	1	2,000
5	Analog Multimeter	2	1,000
6	Electronic Screw driver & Screw Feeder	4	20,000
7	Combined Soldering & Desoldering Station	1	6,000
8	High Speed Mini Drill Set	1	4,000
9	Drilling Machine	1	2,000
10	Personal Computer with UPS & Printer	2	40,000
Total			**1,61,000**
11	Electrification charges @10% of cost of machinery & equipment		16,100
12	Office Furniture/Test Bench		1,00,000
13	Pre – operative expenses		25,000
Total Fixed Cost			**3,02,100**

Working Capital:

Recurring Expenditure per month

- **Staff & Labour Expenditure**

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Sl. No.	Designation	No. of person	Total Salary per month(`.)
1	Technical cum Sales Manager	1	15,000
2	Technical Staff	3	27,000
3	Semi Skilled worker	2	12,000
4	Accountant	1	7,000
Total Salary			61,000
Perquisites @15%			9,150
Total			**70,150**

- **Raw Materials per month**

Sl. No.	Description	Qty.	Price(`.)
1	LCD Driver Unit	500	1,50,000
2	Injection Molded Plastic Case(2 channel)	250	75,000
3	Injection Molded Plastic Case(4 channel)	250	75,000
4	Printed Circuit Boards	500	40,000
5	Electronic Components		2,00,000
6	Connecting Cable, Socket, Pin, Fuse holder, Probes and Mechanical Parts.		60,000
7	Packing material	500	5,000
8	Consumables – solder, flux etc.		5,000
9	AC Adapter	500	60,000
10	Battery	500	10,000
Total			**6,80,000**

- **Utilities per month**

Sl. No.	Utility	Cost (`.)
1	Power	5,000
2	Water	1,000
Total		**6,000**

- **Other Contingent Expenses per month**

Sl. No.	Description	Amount (`.)
1	Rent	15,000
2	Postage & Stationery	2,000
3	Telephone	2,000
4	Repair & Maintenance	2,000
5	Transport & Conveyance	12,000
6	Advertisement & Publicity	7,000
7	Insurance	1,000

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8	Miscellaneous Expenditure	3,000
Total		**44,000**

Expenditure	**Amount (`.)**
Total Recurring Expenditure per month	7,30,000
Working Capital for 3 months	21,90,000

Capital Investment	**Amount (`.)**
Fixed capital	3,02,100
Working capital (3 months)	21,90,000
Total	24,92,100
Margin Money	6,23,025
Loan Amount	18,65,000

FINANCIAL ANALYSIS

Sl. No.	**Financial Aspect/Ratio**			**Amount/%**
1	Cost of Production per annum			
	Total Recurring Expenditure			87,60,000
	Depreciation of Machinery & Equipment @10%			16,100
	Depreciation of Office Equipments & Furniture @20%			20,000
	Interest on Loan Availed @15%			2,79,750
	Total			**90,75,850**
2	Turnover per annum			
	Item	Qty	Rate	
	4 Channel Pain Reliever	3000	2400	72,00,000
	2 Channel Pain Reliever	3000	1000	30,00,000
	Total Turnover			1,02,00,000
3	Profit per annum(before tax)			11,24,150
4	Net Profit Ratio = Net Profit x 100 / Total Turnover			12.386
5	Rate of Return = Net Profit x 100 / Total Capital Investment			45.1085
6	Break Even Point			

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	Fixed Cost per annum	
	Rent	1,80,000
	Depreciation of Machinery & Equipment @10%	16,100
	Depreciation of Office Equipment & Furniture @20%	20,000
	Interest on Loan availed @15%	2,79,750
	40% of salary & wages	3,36,720
	40% of other contingent expenses excluding rent & insurance	1,34,400
	Total Fixed Cost	9,66,970
	Break-even point = Fixed cost x 100 / (Fixed cost + Net Profit)	46.241

Name and Address of Machinery, Equipment and Raw Material Suppliers

For LCD/PCB/Electronic Components:

- M/s Component and Devices
  Near Medical trust Hospital,
  Manikkiri Cross Road
  Ernamkulam,Kerala
  Phone:91-4842353150,2382250
  E mail : component @md3.vsnl.net.in
- M/s Kerala sales corporation
  Post Office Road,
  Chettiyagadi. Thrissur
  Kerala.
  Phone : 0487 2420894, Fax : 0487 2425538

Test Equipments:

- Aplab Limited
  XL 1/583,II Floor
  Krishna Nivas
  Adv.Eashwara Iyer Road,
  Kochi 682 035 Phone 0484 2361623
  Email: aplabkochi@vsnl.net.

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