

₹ 200

ISSN - 2249-555X

Volume : 1 Issue : 6 March 2012



Journal for All Subjects

www.ijar.in

Listed in International ISSN Directory, Paris.



ISSN - 2249-555X

Indian Journal of Applied Research

Journal for All Subjects

Editor-In-Chief

Dr A Kumar

Director, College Development Council (CDC)
Director, Internal Quality Assurance Cell (IQAC)
Professor in Management,
Department of Business Administration, Faculty of Management,
Bhavnagar University,

Editorial Advisory Board

Dr. S. N. Pathan
Maharashtra

Dr. SM. Ramasamy
Gandhigram

Dr. M. M. Goel
Kurukshetra

Dr. S. Ramesh
Tamil Nadu

Dr Ramesh Kumar Miryala
Nalgonda.

Dr. B. Rajasekaran
Tirunelveli

Dr. A. R. Saravankumar
Tamilnadu

Dr. Roy M. Thomas
Cochin

Dr. G. Selvakumar
Salem

Dr. Apurba Ratan Ghosh
Burdwan

Dr. Shrawan K Sharma
Uttarakhand

Dr. Sudhanshu Joshi
Uttarakhand

Prof. (Dr.) B Anandampilai
Pudhukottai

Advertisement Details

Position	B/W (Single Color)	Fore Color
Full Inside Cover	₹ 6000	₹ 12500
Full Page (Inside)	₹ 5000	-

Subscription Details

Period	Rate	Discount	Amount Payable
One Year (12 Issues)	₹ 2400	Nil	₹ 2400
Two Year (24 issues)	₹ 4800	₹ 200	₹ 4600
Three Year (36 issues)	₹ 7200	₹ 300	₹ 6900
Five Year (60 issues)	₹ 12000	₹ 600	₹ 11400

You can download the Advertisement / Subscription Form from website www.ijar.in. You will require to print the form. Please fill the form completely and send it to the **Editor, INDIAN JOURNAL OF APPLIED RESEARCH** along with the payment in the form of Demand Draft/Cheque at Par drawn in favour of **INDIAN JOURNAL OF APPLIED RESEARCH** payable at Ahmedabad.

1. Thoughts, language vision and example in published research paper are entirely of author of research paper. It is not necessary that both editor and editorial board are satisfied by the research paper. The responsibility of the matter of research paper/article is entirely of author.
2. Editing of the Indian Journal of Applied Research is processed without any remittance. The selection and publication is done after recommendations of atleast two subject expert referees.
3. In any condition if any National/International University denies accepting the research paper published in IJAR, then it is not the responsibility of Editor, Publisher and Management.
4. Only the first author is entitle to receive the copies of all co-authors
5. Before re-use of published research paper in any manner, it is compulsory to take written permission from the Editor-IJAR, unless it will be assumed as disobedience of copyright rules.
5. All the legal undertaking related to Indian Journal of Applied Research is subject to Ahmedabad Jurisdiction.
7. The research journal will be send by normal post. If the journal is not received by the author of research papers then it will not be the responsibility of the Editor and publisher. The amount for registered post should be borne by author of the research paper in case of second copy of the journal.

Editor,

Indian Journal Of Applied Research

8-A, Banans, Opp. SLU Girls College, New Congres Bhavan, Paldi,
Ahmedabad-380006, Gujarat, INDIA

Contact.: +91-9824097643 E-mail : editor@ijar.in

INDEX

Sr. No.	Title	Author	Subject	Page No.
1	Impact of Liquid biofertilizers, Chemical fertilizers and Vermicompost on the Growth and Yield of <i>Chenopodium album</i> (L.)	Dr. Sivgami Srinivasan, A. Sabitha	Biochemistry	1-3
2	Production Of Biodiesel From Microalgae Using Sodium Methoxide	M. R. Ananadhi Padmanabhan, Dr. Shaleesha A.Stanley	Biotechnology	4-6
3	Profitability Analysis Of Bharath Sanchar Nigam Limited (Bsnl)	Dr. M.Dhanabhakyaam, Swapna Kurain	Commerce	7-9
4	Water Resource Management Through Community Initiatives	Dr. Mahalaxmi Krishnan	Commerce	10-11
5	IPO Grading – An Insight	Dr. Bheemanagouda	Commerce	12-14
6	Public Private Partnership (PPP) in West Bengal: A Study	Suvarun Goswami	Commerce	15-17
7	Factors Influencing Impulse Buying of Personal Care Products in Salem City	Dr. A. Vinayagamoorthy, P. kannan	Commerce	18-21
8	Employees Savings and Investment Behaviour of Selected Chemical Industries in Cuddalore District	Dr. G. Sasikumar, R. Punniyaseelan	Commerce	22-28
9	Object Oriented Mutation Applied to Java platform and C++ classes	Ravindra K. Gupta, Dr. Shailendra Singh, Titu Singh Arora	Computer Science	29-32
10	Estimating The Intravenous Fluid Resuscitation In Patients In The Intensive Care Units (A Fuzzy Logic Based Expert Advisory System)	Kamal Kumari Dadhirao, M. Surendra Prasad Babu, Mr. Suresh Kumar Maddila	Computer Science	33-36
11	An Evaluation of Women Construction Workers	T. Christy Chanchu, T. Christy Cresida	Economics	37-39
12	Carlson's Tropic State Index(CTSI) Used in Mandya Lakes	Nagarathna, Hosmani S P	Economics	40-42
13	A water pollution of metropolitan cities in India	Dr. Pawar A.S.	Economics	43-44
14	Urbanization & Pollution in India	Dr. Pawar Ashok Shankarrao	Economics	45-46
15	Motivational Strategies on Enhancing Competencies of LIC Professionals	Dr. K. Gunasekaran	Education	47-49
16	Awareness On Socio - Educational Rights Among Students Studying in Secondary School	Dr. A. Selvan, Dr. P. Paul Devanesan	Education	50-52
17	Major Approaches in Instilling Values Related to Human Rights	Dr. A. Selvan, P. Paul Devanesan	Education	53-54
18	A Study On Achievement In Mathematics of IXth Standard Students in Relation to Locus of Control and Test Anxiety	Dr. N .Rajashékara, Prathima .H.P, Narayana Swamy.Y.R	Education	55-58
19	Impact of value-orientation on Leadership Behaviour of Secondary School Teachers in Tumkur District	Dr. Umme kulsum, G.P.Nagaraja	Education	59-62
20	Performance Comparison between LMS and NLMS Algorithm	Baljit Kaur	Engineering	63-65
21	Overview of Speech Enhancement Techniques for Various Applications	N B Umashankar, Anand Jatti	Engineering	66-67

22	Hanford and Radioactive Tumbleweeds: A Case Study	Rajesh Gopinath	Engineering	68-69
23	Construction of a Knowledge Test for Tennis Players	Sanjay Singh, Sani Kumar Verma	Engineering	70-72
24	A Noval Switch Mode Power Supply for Flash Lamp Pumped Nd: Yag Laser	Kireet Semwal, S. C. Bhatt	Engineering	73-75
25	Uniform Price Electricity Market Model in Deregulated Power System	T. Nireekshana, Dr. G. Kesava Rao, Dr. S. Siva Naga Raju	Engineering	76-79
26	Effect of Notch Orientation, Temperature and Filler Material on Impact Toughness of GFRP Composites	M.C.Muruges, Dr. K. Sadashivappa	Engineering	80-83
27	Prediction of Heat transfer rate for Indian coal slurry based on regression analysis	C.M. Raguraman, A. Ragupathy, L. Sivakumar	Engineering	84-86
28	A study of antimicrobial activity of the flavonoid- Kaempferol-3-rutinoside- from <i>Gliricidia sepium</i> (Jacq.) kunth.ex.Walp.	Anandhi, B., Sukumar. D, Arivudainambi. R	Engineering	87-88
29	Amitav Ghosh: Transfiguration of Memory and Imagination in the Shadow Lines	S.Kokila	English	89-90
30	Shareholder Activism in the U.S. and India	Ch. Chaitanya	Finance	91-93
31	Growth and Trends of Population in Nanded City, Maharashtra	Dr. Rathod S. B.	Geography	94-96
32	Regional Disparities of Ground water irrigation in Solapur District: A Geographical Analysis	Dr. G.U.Todkari, Shri B.D. Patil	Geography	97-99
33	Women and Employment in Textile Industries	Dr. S. S. Vijayanchali, Dr. E. Arumuga Gandhi	Home Science	100-102
34	Transition in Nutrition and Marketing of Agro Products	Dr. Anjali Rajwade	Home Science	103-104
35	Assessment of Knowledge About Effects of Inadequate Dietary Pattern on Mother and Child Health	Dr. Anjali Rajwade, Dr. Charuta Rajwade	Home Science	105-106
36	Job Enrichment	Kapil Dev Upadhyay, Dr. (Prof.) Vijay Kumar Soni	Human Resource Management	107-108
37	Quality of Work Life	Himani Avasthi, Dr. (Prof.) Vijay Kumar Soni	Human Resource Management	109-110
38	Understanding Security Requirement Engineering	Velayutham Pavanasam, Chandrasekaran Subramaniam	Information Technology	111-112
39	GENE Prediction	Er. Pankaj Bhambri, Dr. O.P. Gupta, Er. Meenakshi	Information Technology	113-114
40	Predictive Analysis In Data Mining Using Weighted Associative Classifier	Suwarna Gothane	Information Technology	115-119
41	Exchange Rate Forecasting	Dr. T. Koti Reddy	International Trade	120-124
42	Mass Media in India – New Trends	J. Ramanjaneyulu	Law	125-127
43	Right to Education Under the Indian Constitution	Mannava Muni Hemachand	Law	128-130
44	Criminal Law: A Tool for Consumer Protection in India	Aneesh V. Pillai	Law	131-132

45	Public Trust Doctrine: A Repository of Governmental Obligations to Protect the Environment	Dr. Kaumudhi Challa	Law	133-134
46	Application of Biometrics in the Investigation of Crime	Dr. R. Thilagaraj, Mr. G. Deepak Raj Rao	Law	135-137
47	Factors and Situations of Language Change	Dr. Syed Mohammed Haseebuddin Quadri	Literature	138-139
48	Omprakash Valmiki ke kahanio me chitrit dalitoki samajik stithi	Dr. V. P. Mahalinge	Literature	140-141
49	Fund Management in Pharmaceutical Industry in India	Dr. R. Perumal	Management	142-145
50	A study of Relationship management with customers in hospitality sector	Afreen Nishat A. Nasabi	Management	146-147
51	Outsourcing of Geriatric Services	Dr. V. Sreedevi	Management	148-150
52	Factor Analysis and Business Research	Dr. Kakali Majumdar	Management	151-154
53	Faculty Turnover Intention in Educational Institutions	K. R. Sowmya, Dr. N. Panchanatham	Management	155-156
54	Corporate Governance	Kalola Rimaben A., Chauhan Lalit R.	Management	157-159
55	Investment Avenues and Tax Implications for Small Investors	P. Menakadevi, Dr. V. Kumaravel	Management	160-163
56	Analyzing the IT Industry Progressions and Comprehensive Market Downfall Consciences through Deliberate Thinking	Dr. Venkatesh. J, Ms. Aarthy. C	Management	164-166
57	A Study On Problems and Prospects of Farmers in Cultivation of Paddy in Mahabubnagar District, A.P	Mr. M. Madhu Mohan	Management	167-170
58	An Analytical Study of Cash Management of IT Industries in Global Era	Bhaves P Chadamiya, Mital R Menapara	Management	171-173
59	The Status & Performance of Registered Small Enterprises; A Study in Karnataka	Dr. D. Kumuda	Management	174-179
60	Malnutrition – A Business Opportunity for State Cooperative Dairy Federations (Scdfs)	Dr. N. Ramanjaneyalu	Management	180-181
61	Financial Performance of Indian Corporate Sectors During Pre and Post Mergers and Acquisitions	Dr. Shailesh N. Ransariya, Dr. Butalal C. Ajmera	Management	182-184
62	A Study on Influence of Pedagogical Effectiveness on Academic Achievement of Students of B Schools	Dr. Viral Shilu	Management	185-186
63	Stimulation of Entrepreneurship through Venture Capital in India	Vijayakumar, Subrahmanya K C	Management	187-189
64	Performance Analysis of Indian Banks	Ajay K. Shah	Management	190-192
65	An Emprical Study on Effect of Combination of Sun with Different Zodiac Signs on Return of it Sector of Indian Stock Market	Dr. Jaydip Chaudhari, Pinkal Shah	Management	193-197
66	Internet Banking Customer Satisfaction and Online Banking Service Attributes	Md. Mahtab Alam, Dr. Umesh R. Dangarwala	Management	198-199
67	Changing Customer expectations & preferences in Indian Banking	Ms. Smita S. Shetty	Management	200-202
68	Current e-Governance Scenario in Healthcare sector in India	Samir Roy	Management	203-204

69	Liver function abnormality & Vestibular symptoms with Azithromycin	Dr. Parveen Kumar Sharma, Dr. Rekha Bansal	Medical Science	205-206
70	Unicornuate Uterus with Functional Noncommunicating Rudimentary Horn - A Rare Mullerian Anomaly	Anju Kumari Rani, Anand Prakash, Deepa Kapoor	Medical Science	207-208
71	Antenatal Diagnosis and Successful Delivery of a Fetus with Complete Heart Block	Anju Kumari Rani, Aditya Kapoor, Deepa Kapoor	Medical Science	209-210
72	Kangaroo mother care diminishes pain from heel lance in preterm neonates:	Dr.S.Valliammal, Dr. Ramachandra, Mr. Raja Sudhakar	Nursing	211-213
73	Experiential Domain and Extentionalistic Vocabulary : A Critical Consideration of Behaviourism	Dr. Jatinder Kumar Sharma	Philosophy	214-215
74	The Effect of a Mindfulness-Based Stress Reduction (MBSR) Program on Stress and Well-Being in Adolescents: A Pilot Study	Urvashi Anand, Dr. Mahendra P. Sharma	Psychology	216-218
75	Personality Profile of Patients with Somatic Complaints at a Rural Health Centre	Dr. Mahendra P. Sharma, B. Padmasri and, Dr. Ramchandra	Psychology	219-220
76	Psychological Well-being: A study of the institutionalized aged	Dr. Pankaj S. Suvera	Psychology	221-223
77	Crystal Growth, Thermal and Optical Studies on L-arginine Based Nonlinear Optical Material	J. Ramajothi	Science	224-226
78	Encapsulation of Lactic Acid Bacteria in Calcium Alginate Beads for Bacteriocin Production	Vijay S. Wadhai, Shweta G. Kayarkar, Archana N. Dixit	Science	227-229
79	Synthesis Of Nonatitnate Based Dielectric Ceramic Using Various Grain Size of Starting Materials	Parul, Anand K Tyagi	Science	230-232
80	Separate Telangana Movement and Related Literary Works: A Study In Sociology of Literature	Dr. M. Sreedevi Xavier	Sociology	233-234
81	Changing Interests In Fine Arts as a Profession: A Study In Sociology of Art	Dr. Poonam Gandhi-Moirangthem	Sociology	235-236
82	Modeling Fertility and Growth of Mising Community of Assam, India	Deba Kr. Baruah, S. C. Kakaty	Statistics	237-239
83	Fort Vasota an Adventure Tourism Destination in Satara District	Dr. Ananadrao S. Patil	Tourism	240-242



A Noval Switch Mode Power Supply for Flash Lamp Pumped Nd: Yag Laser

* Kireet Semwal ** S. C. Bhatt

* Applied Science Department, GB Pant Engineering College, Pauri (Garhwal), Uttarakhand

** Department of Physics, HNB Garhwal University Srinagar (Garhwal), Uttarakhand

ABSTRACT

Nd: YAG laser is pumped by a simple & compact 12 V to 600 V, DC-DC Switch Mode Power Supply using Fly-Back Topology. This power supply is capable of charging 270 μ F capacitor at 600 V and discharge at the rate of 5 pps. Which generates 50 Joules 10 W energy at 100 kHz. It also generates a 20 KV trigger pulse employing to trigger laser flash lamp. The major components of a power supply employed in a flash lamp pumped laser are a charging unit, a pulse-forming network, and a flash lamp trigger circuit. Transistor 2N3055 is used as a switching element, and IC SG3524 is used as a pulse-width-modulator.

A feature of this power supply is the fact that the repetition rate of the DC-DC converter progressively increases from 1kHz to about 100 kHz during the charge cycle in order to keep the peak-to-peak rms current drawn from the battery at a low value. This is achieved by a current-sensing network which feeds a signal to the logic circuit, which in turn controls the switching frequency of the transistors in the DC-to-AC inverter. At full capacitor charge a voltage sensor turns off the driving signals to the transistors. The switching transistor is turned on for a short period of time to allow current flow in the primary of the inductor. When the transistor is turned off, the magnetic energy stored in the inductor is transferred to the energy storage capacitor; at the same time the voltage is stepped up from 12 V to approximately 600 V. The trigger circuit consists a trigger transformer with a capacitor and a SCR in the primary. When the capacitor is discharged, a high voltage of 20 kV is generated at the secondary, which breaks down the lamp.

Keywords :

Introduction:

The rapid advancement of microelectronics in recent years demanded the development of sophisticated, efficient and lightweight power system, which has a high power-to-volume density ratio with no compromise in performance. The high frequency switching power supply meets these demands and recently it has become the prime-powering source in the majority of modern electronic designs. Solid-state lasers have been extensively used in a broad range of industrial, military and medical applications. In optically pumped solid-state lasers the light source must supply the maximum possible light output in the spectral region that can be absorbed by the laser material. Electrical current, either continuous or pulsed, is supplied to the pump source and converted into optical radiation. The application of a particular pump source depends on the desired output power, the mode of operation, i.e., pulsed or continuous operation, high or low repetition rate, etc., and on the laser material which has to be pumped. Flashlamps are commonly used for the pumping of various solid-state lasers. Commercially available Nd:YAG lasers have power supplies which provides continuously variable regulated DC voltages. The major components of a power supply employed in a flash lamp pumped laser are a charging unit, a pulse-forming network, and a flash lamp trigger circuit.

A low voltage DC supply provides power to an oscillator. A low voltage AC output of the oscillator supplies high voltage AC power through the transformer then this is rectified and filtered to get the DC output shown in Fig.3. The heart of DC/DC converter is power transformer. Small size and high efficiency are two desirable parameters in power converter. Small size is achieved by an increased frequency which in turn increases the core losses. To design a transformer for the fly back converter Ferrite pot core is used here. Ferrite core in this form has usable frequency range from 1 kHz to 20MHz.

Power transformer is designed as follows [2]:

Step-1 First it is necessary to calculate the transformer peak primary current from fundamental inductor voltage relationship.

$$P_{out} = \frac{1}{2} L_p I_{pp}^2 f$$

And

$$I_{pp} = \frac{2P_{out}}{V_{in} \delta} \approx 3.34 A$$

Where V_{in} = dc input voltage (V) = 12 V, L_p = transformer primary inductance (mH), d = duty cycle (ms) = 0.5, f = switching frequency (kHz) = 100, I_{pp} = peak transformer current (A). The output power in the complete energy transfer mode is equal to the energy stored per cycle times the operating frequency, $P_{out} = 10 W$.

Step-2 Calculate transformer primary inductance. Since the peak primary current is now known, the transformer choke primary inductance is now calculated by

$$L_p = \frac{V_{in} \delta}{I_{pp} f} \approx 18 \mu H$$

Step-3 Select the minimum size core. From magnetic core catalog pick the core material and geometry, which suits our application. If we were to wind only the primary winding in to the bobbin, the winding area A_c and core effective area A_e would be related by

$$A_c A_e = \frac{(25.32 L_p I_{pp} D^2) 10^8}{B_{max}} \approx 1.6 cm^4$$

Where D is the diameter of the insulated wire and $B_{max} = B_{sat}/2$. Choosing a design current density value 400 cm/A for the winding magnetic wires, for the winding magnetic wires.

Therefore the primary wire gauge is SWG 19, has diameter $D = 0.1$ cm. $B_{sat} = 3300$ Gauss at 1000 C. For this design $B_{max} = B_{sat} / 2 = 1650$ G.

Step-4 Calculate the core air gap length. For practically calculated $A_e = .84$ cm², air gap length is given by

$$l_g = \frac{(0.4\pi L_p I_{pp}^2) 10^8}{A_e B_{max}^2} \approx 0.0098 \text{ cm}$$

Step 6: Calculate transformer number of primary turns.

$$N_p = \frac{B_{max} L_g}{0.4\pi I_{pp}} \approx 4$$

Step 7: Calculate number of secondary turns. Taking the output rectifier diode drop V_D into account, the output voltage V_s of specific secondary winding is written accordingly. Thus

$$N_s = \frac{N_p (V_s + V_D)(1 - \delta)}{V_{in} \delta} \approx 200$$

Driven flyback converter

Here the IC SG3524 is used as a pulse-width-modulator and transistor 2N3055 is used as a switch. In PWM IC SG3524, an oscillator generates an asymmetric square wave output at a fixed frequency, i.e., 100 kHz. The flip-flop and the NOR gate circuitry changes the duty cycle of the square wave train, which is passing through it. This changed duty cycle pulse is used to turn off the normally conductive transistor Q_1 . The resulting negative going pulse at the collector of transistor Q_1 is inverted by transistor Q_2 , producing a positive going pulse at the collector of Q_2 . The low impedance output driver combination of Q_3 and Q_4 is used to switch the main switching transistor Q_5 , ON or OFF, thus transferring energy to the output of the converter through the transformer-choke T_1 . Regulation is achieved by comparing a portion of the output voltage, derived by voltage divider R_1 and R_2 , against a fixed reference voltage V_{ref} and an op-amp compares the feedback signal from the output of the power supply to this fixed reference voltage V_{ref} . The error signal is amplified and fed into the inverting input of a comparator. The noninverting input of the comparator accepts a sawtooth waveform with a linear slope, generated by a fixed-frequency oscillator. The oscillator output is also used to toggle a flip-flop, producing square wave output Q and \bar{Q} .

The comparator square wave output and the flip-flop outputs are both used to drive the NOR gates, enabling each output when one inputs to the gate are "Low". The result is a variable duty cycle pulse train at channels A and B. The output pulse width is modulated when the error signal changes its amplitude. Normally the outputs of the PWM controller are externally buffered to derive the main power switching transistors. This type of circuit may be used to drive either two transistors or a single transistor. Error amplifier controls any change at the output due to line or load variation, which drives the base of transistors Q_1 and Q_2 , and Q_3 to be on for longer period of time, while transistors Q_4 and Q_5 are switched on for a period. Thus the pulse width is modulated according to load and line conditions, stabilizing the output voltage.

An internal linear sawtooth oscillator is frequency-programmable by two external components, R_T and C_T , connected on pin 6 and 7 respectively. The oscillator frequency is determined by

$$f_{osc} = \frac{1}{R_T C_T}$$

Output pulse-width modulation is accomplished by comparison of the positive sawtooth waveform across capacitor C_T to either of two control signals. The NOR gates, which drive output transistor Q_1 and Q_2 , are enabled only when the flip-flop clock-input line is in its low state. This happens only during that portion of time when the sawtooth voltage is greater than the control signals. Therefore, an increase in control-signal

amplitude causes a corresponding linear decrease of output pulse width.

The square output pulse from pin 14 of PWM drives the direct-coupled power transistors Q_3 and Q_4 , as shown in Fig 2. An emitter-follower comprised of transistors Q_3 and Q_4 alternately switches the base of Q_5 to V_{cc} (12V) or ground, thus turning it on or off. When Q_3 is on, transistor switch Q_5 is turns on, also charging capacitor C_3 as shown. Diode D_3 limits the charge on C_3 and also provides a path for the forward base drive current I_{B1} , which is set by resistor R_4 . With transistor Q_3 off and Q_4 on, the charge capacitor C_3 is effectively connected to the base-emitter of Q_3 , causing reverse current I_{B2} to flow because of the polarity of the capacitor. The value of I_{B2} depends on the gain of Q_3 , the value and therefore the charge on capacitor C_3 , and the circuit impedances.

The Q_6 transistor and its associated components make up a current-overload protective circuit. If there is excessive current through the .25W sensing resistance, this transistor turns on. In so doing, it inhibits the drive signal from the PWM. The nature of the protection is such that repetitive attempts to resume normal operation are made at a rate governed by C_2 capacitor. As long as the overload persists, such attempts merely result in shut-off of the drive. But, if the fault is cleared, normal operation automatically resumes. The D_1 diode protects the "Comp" terminal (Pin 9) so that the C_1 capacitor does not affect internal frequency compensation. Since the transformer T_1 in the flyback converter also acts as a storing energy inductor, diode D_4 and capacitor C_4 are the only two elements necessary to produce a dc output. The transistor is turned on for a short period of time to allow current flow in the primary of the inductor. When the transistor is turned off, the magnetic energy stored in the inductor is transferred to the energy storage capacitor; at the same time the voltage is stepped up from 12 V to 600 V. The device is short circuit protected since the inductive voltage kickback charges the capacitor after the transistor has turned off.

Trigger circuit: Flash lamps require high voltages of the energy storage capacitor because of their high impedance. Triggering of the flashlamp is initiated by a 15 to 20 kV trigger pulse in the series injection trigger transformer and by simultaneously triggering the ignitron to allow bank discharge. Figure-3 shows a power supply which can charge 50 J capacitor bank at a repetition rate of 5pps. The discharge of the stored energy into the flashlamp is generally initiated by a high-voltage trigger pulse. The function of the trigger signal is to create an ionized spark streamer between the two electrodes so that the main discharge can occur. The initial spark streamer is formed by the creation of a voltage gradient of sufficient magnitude to ionize the gas column. In the series injection method, a pulse is generated in a transformer whose secondary winding is in series with the flash lamp. The high voltage pulse causes initial ionization of the plasma. When a series trigger circuit is used, the secondary of the trigger transformer is part of the lamp discharge circuit; therefore the resistance of the secondary winding should be much less than the flashlamp resistance.

The trigger circuit consists a trigger transformer T_2 with a capacitor and a SCR in the primary as a trigger controlled by a diac. When the capacitor is discharged, a high voltage (20 kV) is generated at the secondary which breaks down the lamp. Flashlamps are usually operated from a single- or multiple-mesh LC network, called pulse forming network (PFN). The network stores the discharge energy and delivers it to the lamp in the desired current pulse shape. According to [1] the inductance is calculated as $L = \frac{t_p}{9C}$, where t_p is pulse width. The waveform of a typical flashlamp trigger pulse is given in Figure-5.

Result & Discussion: In this paper flyback dc-to-dc converter produce 12 V dc to 600 V dc with pulse width modulation. This power supply is capable of charging 270 mF capacitor at 600 V and discharge at the rate of 5 pps. Which generates

50 Joules 10 W energy at 100 kHz. It also generates a 20 KV trigger pulse employing to trigger laser flash lamp. This power supply is constructed for the pumping of Nd:YAG laser, since it is operated under such high pulse-repetition rate.

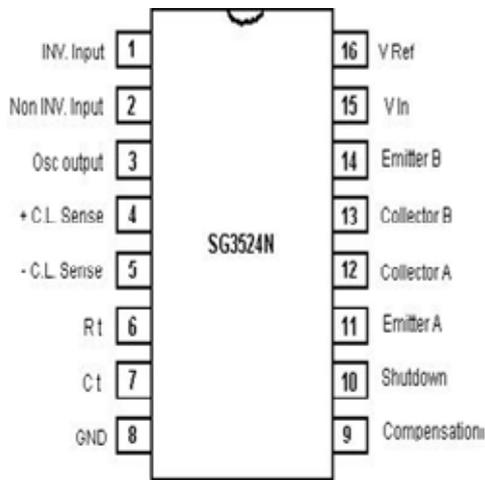


Fig. 1 Pin diagram of IC SG3524N

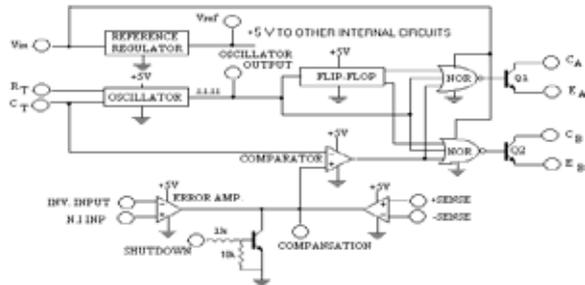


Fig. 2 Internal Circuit of IC SG3524N

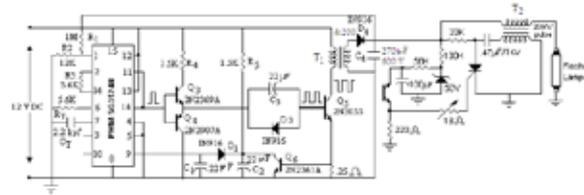


Fig. 3 Flyback Mode DC-DC Converter & Flashlamp Trigger Circuit

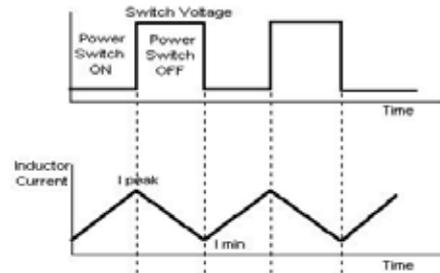


Fig. 4 Output characteristics of switching transistor & primary inductor of T1

REFERENCES

1. Walter Koechner, Solid State Laser Engineering, 5th ed., (Springer Berlin 2006) | 2. Chryssis George; "High-Frequency Switching Power Supplies: Theory and Design". Tata McGraw Hill Publication. | 3. Hnatek, Eugene R.; "Design of Solid State Power Supply". Van Noytrand Reinhood Comp New York. | 4. Kulratna, Nihal; "Power Electronic Design Hand Book". Tata McGraw Hill Publication. | 5. Gotlib, Irving M.; "Power Supplies Switching Regulator, Inverter & Converters". BPB Publication New Delhi.



Sara Publishing Academy
Indian Journal Of Applied Research
Journal for All Subjects



Editor,
Indian Journal Of Applied Research
8-A, Banans, Opp. SLU Girls College,
New Congres Bhavan, Paldi, Ahmedabad-380006.
Contact.: +91-9824097643 E-mail : editor@ijar.in